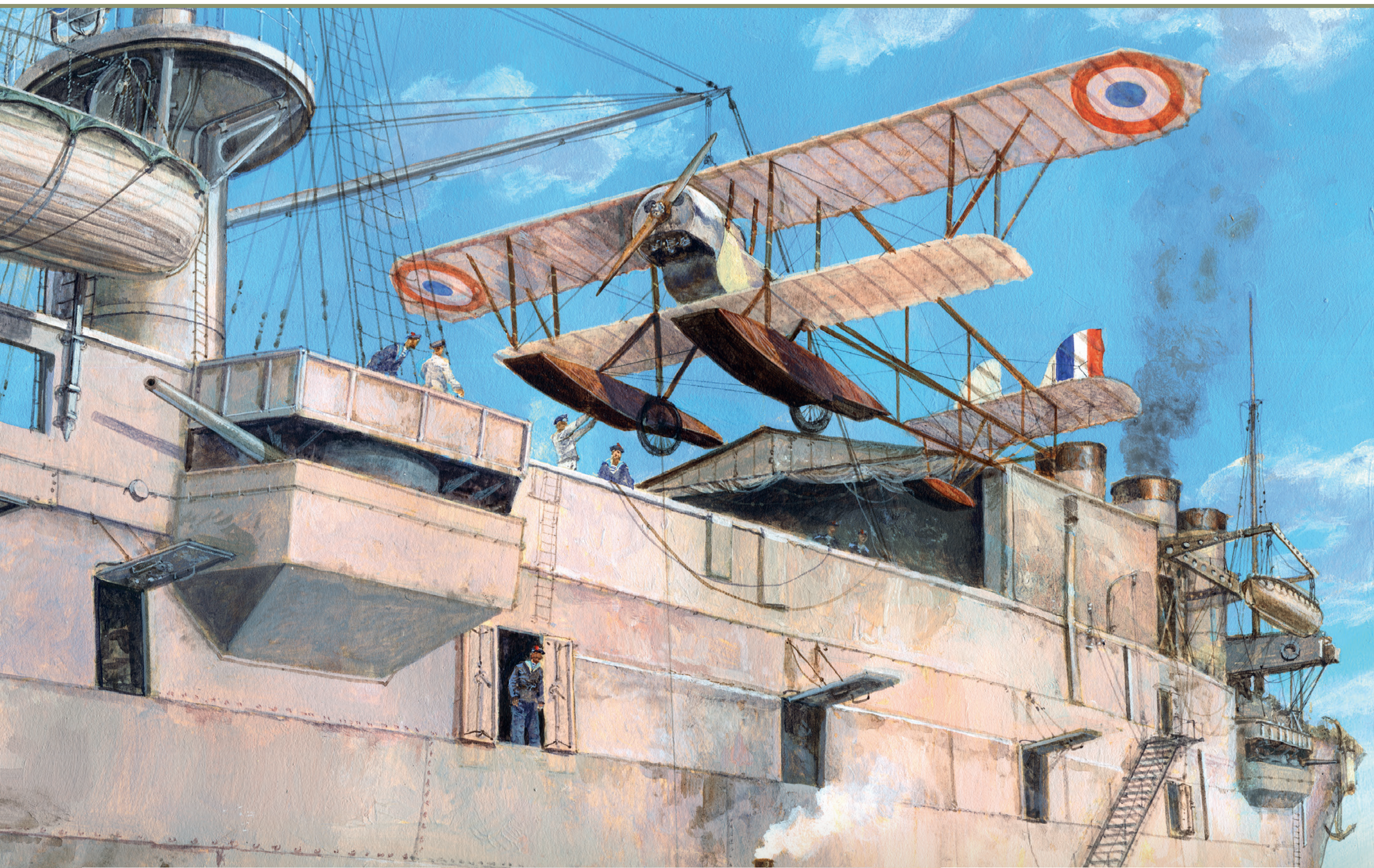
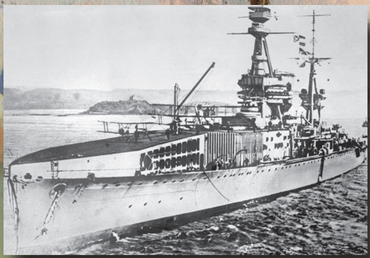
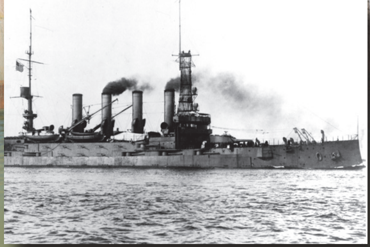
WORLD WAR I SEAPLANE AND AIRCRAFT CARRIERS







MARK LARDAS

ILLUSTRATED BY PAUL WRIGHT

Author

Mark Lardas holds a degree in Naval Architecture and Marine Engineering, but spent his early career at the Johnson Space Center doing Space Shuttle structural analysis, and space navigation. An amateur historian and a long-time ship modeller, Mark Lardas is currently working in League City, Texas. He has written extensively about modelling as well as naval, maritime, and military history.

Illustrator

Paul Wright has painted ships of all kinds for most of his career, specializing in steel and steam warships from the late 19th century to the present day. Paul's art has illustrated the works of Patrick O'Brian, Dudley Pope and C.S. Forester amongst others, and hangs in many corporate and private collections all over the world. A Member of the Royal Society of Marine Artists, Paul lives and works in Surrey.

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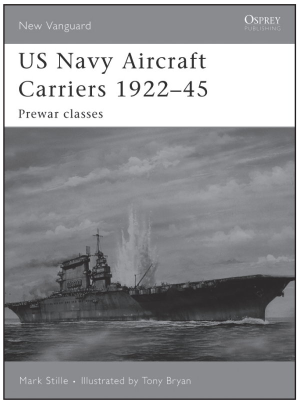
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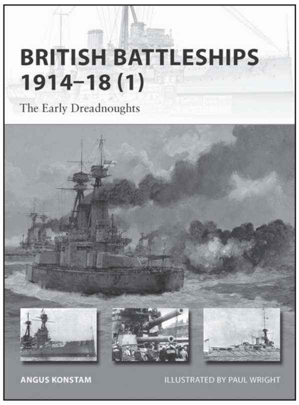
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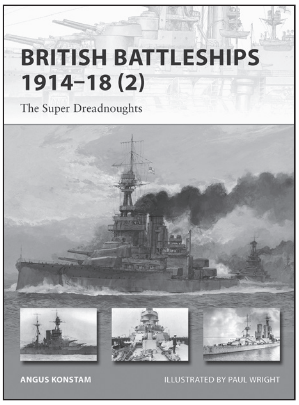
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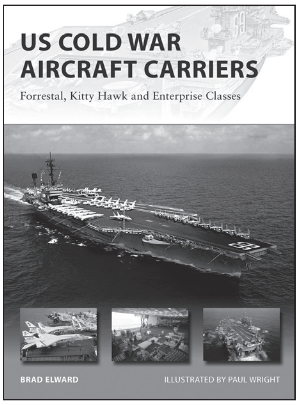
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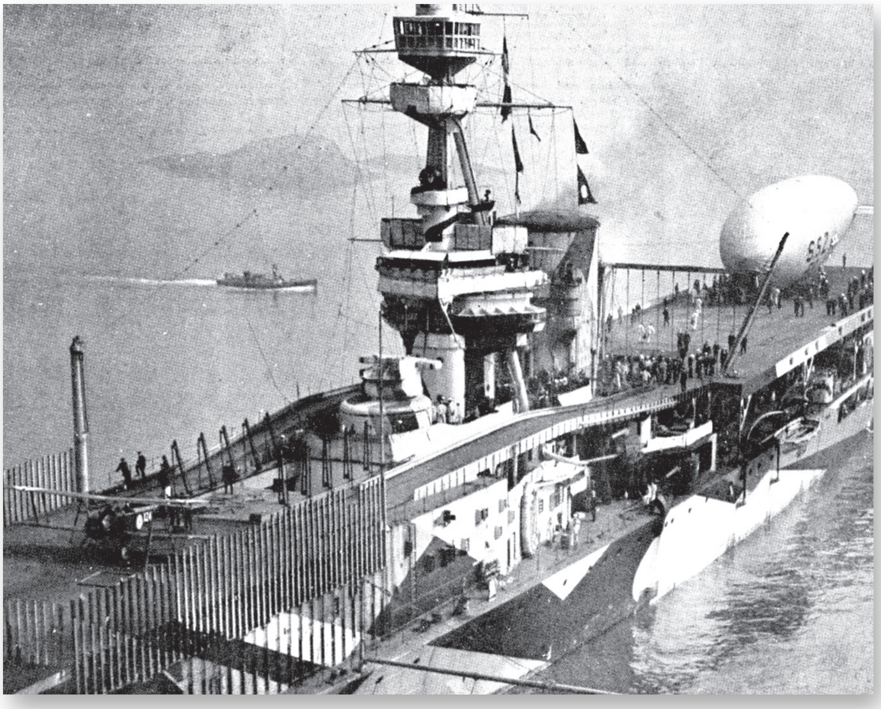

MARK LARDAS ILLUSTRATED BY PAUL WRIGHT

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AUTHOR'S NOTE

The following abbreviations indicate the sources of the illustrations used in this volume:

AC – Author's collection
IWM – Imperial War Museum, London, UK
LOC – Library of Congress, Washington, DC
USN – United States Navy
USNHHC – United States Navy History and Heritage Command, Washington, DC
Other sources are listed in full.

AUTHOR'S DEDICATION

To my brother-in-law, Paul Potter. We have shared an interest in World War I aircraft and warships since we first met, back in high school.

GLOSSARY

Aircraft Carrier: A ship capable of launching and recovering conventional aircraft.

Amphibian: An aeroplane capable of landing either on water or land, typically with wheels attached to the floats.

Armoured Cruiser: A cruiser armoured with intermediate levels of armour and a main battery of 8–10in guns.

Battlecruiser: An armoured warship with a main battery of heavy guns (11in or larger), capable of higher speeds than battleships. Generally a battlecruiser has less armour than a battleship, but more than an armoured cruiser.

Battleship: A heavily armoured warship with a main battery of heavy guns (11in or larger). Pre-dreadnought battleships typically have a main battery of two to four large guns with a secondary battery of armoured cruiser-sized guns, while a dreadnought battleship has a main battery of six to 14 large guns.

Conventional Aircraft: An aircraft with fixed landing gear containing wheels or skids intended for landing on hard surfaces.

Dreadnought: A heavily armoured ship with a main battery of heavy guns (11in or larger) and a light secondary battery. Dreadnoughts have three or more main battery turrets.

Floatplane: An aircraft with floats attached to fixed landing gear, intended for landing on water.

Flying Boat: An aircraft intended to land on water with a buoyant and waterproof fuselage and no floats.

Mixed Carrier: A ship capable of launching, but not recovering, conventional aircraft, which also has facilities for seaplanes.

Protected Cruiser: A cruiser armoured with heavier armour than a scout cruiser, but lighter armour than an armoured cruiser, typically with a scout cruiser main battery.

Scout Cruiser: A light, fast cruiser, typically with minimal armour and a battery of 4–6in guns used for scouting. During World War I they became known as light cruisers.

Seaplane Carrier: A ship with facilities to carry, launch and recover seaplanes at sea.

Seaplane Depot: A ship capable of servicing and maintaining seaplanes at a fixed harbour location. It may lack facilities to store seaplanes.

Trolley: A wheeled truck on which a floatplane can be placed to allow take-off from a deck. The trolley remains on the ship when the aircraft take off.

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WORLD WAR I SEAPLANE AND AIRCRAFT CARRIERS

INTRODUCTION

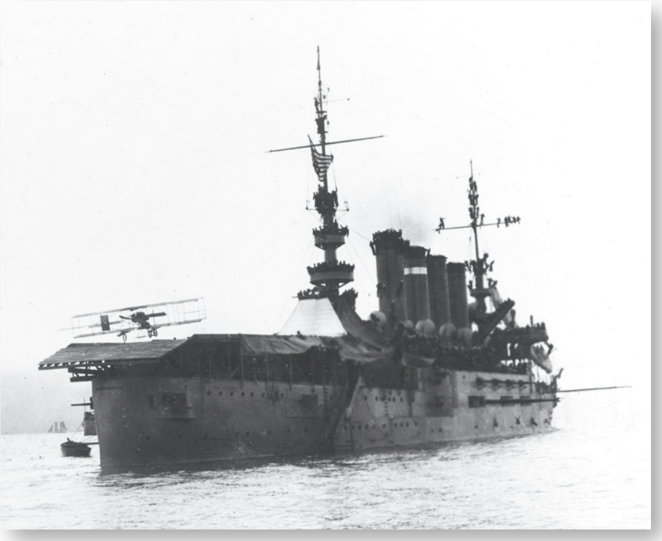
The weather was overcast and hazy in San Francisco on 18 January 1911. The armoured cruiser *Pennsylvania*, moored 300 yards off the Folsom Street wharf, had a 120ft-long wooden platform covering the ship's stern. Ropes anchored by sandbags crossed the platform's width at regular intervals. Shortly after 11.00am, a Curtis pusher appeared flying north, over Hunter's Point. Piloting it was Eugene Ely. He wore a padded football helmet, with bicycle inner tubes crisscrossing his shoulders, for buoyancy, in case something went wrong.

Two months earlier, on 14 November 1910, he had flown a Curtis off the cruiser *Birmingham* in Hampton Roads, Virginia, on the other side of the continent. Then, something very nearly did go wrong. His plane briefly touched water before becoming airborne. He got it back in the air, for the first successful take-off from a ship. On this January day, he was trying something trickier: landing an aircraft on a ship.

Pennsylvania's platform was 50 per cent longer than *Birmingham*'s, but the cruiser was anchored so Ely had to land with the wind at his back. He crossed the ship's stern at 60 miles per hour. His pusher was equipped with a hook designed to snag the ropes crossing the platform, and the crude landing system worked. His aeroplane stopped before reaching the canvas barrier. Thousands of spectators cheered.

Ely received the congratulations of the ship's officers, and shared lunch with them in the ship's wardroom. An hour later, fed and feted as the arresting system was cleared, Ely re-boarded his aeroplane. Launching into the wind this time, he flew back to San Bruno racetrack where he had started.

Eugene Ely had made history with the first successful aircraft landing on a ship, followed by the second successful aircraft launch. For the United States, Ely's accomplishment was a false dawn. Ely



Eugene Ely lands his Curtis pusher aboard the armoured cruiser USS *Pennsylvania* on 18 January 1911. The landing deck was improvised, and compromised *Pennsylvania*'s use as a warship. The arresting system was impractical. (USNHHC) would die in an aircraft crash before the year's end. The United States Navy soon ended its experiments, abandoning shipboard aviation until after World War I.

Within two years, Ely's feat would be duplicated by European navies, however. Within four years many nations were building or converting ships to operate aircraft from. Each nation took different approaches. By late 1918, one nation, Great Britain, planned a 100-plus aircraft raid on the German fleet, an attack aborted on account of the German surrender before it could be mounted. Naval aviation was born.

DEVELOPMENT OF NAVAL AVIATION

The navies of all world powers experimented with shipboard aviation before World War I. Almost all commissioned ships to operate aircraft from during the war. The efforts varied from rudimentary and tentative attempts by the United States Navy to the aggressive and expansive policies of the Royal Navy.

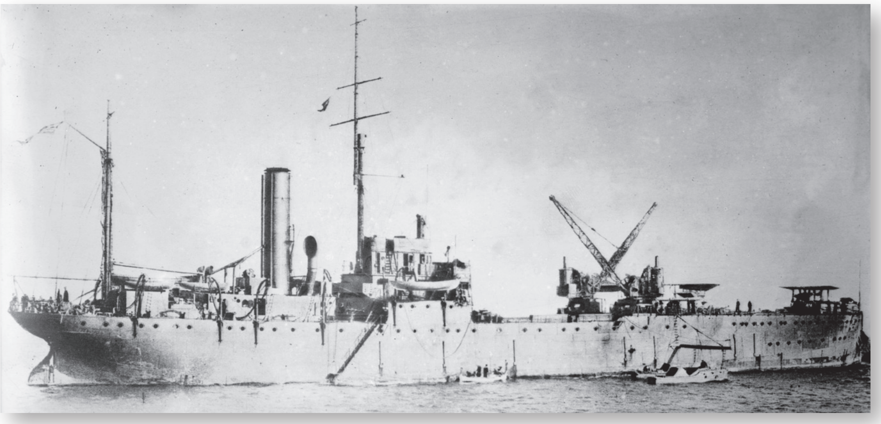
The Royal Navy

Before and during World War I no navy took shipboard basing of aircraft more seriously and more actively than Britain's Royal Navy. Its activities predate Eugene Ely's efforts; in 1909 the Royal Navy began construction of an airship. On 10 January 1912, Britain replicated Ely's feat, launching a Short Brothers pusher aircraft from the pre-dreadnought HMS *Africa*. In May the experiment was repeated aboard another pre-dreadnought, HMS *Hibernia*. The Royal Navy also established what became the Royal Naval Air Service (RNAS). In December 1912 a British shipbuilder, William Beardmore & Company, sent the Admiralty a design for an aviation ship. The ship, described as a 'parent ship for naval aeroplanes and torpedo boat destroyers' resembled a flush-deck aircraft carrier with islands on both sides of the deck serving as hangars. The runway ran between these structures. It was never built.

Initial efforts instead focused on developing ships to operate seaplanes, conventional aircraft with floats replacing the landing gear. (The term

HMS *Hermes* was a Highflyer-class second-class protected cruiser. In 1913 it was converted to Britain's first seaplane carrier. Among its firsts was the first launch of an aircraft from a moving warship. (LOC)

HMS *Ark Royal* was the first warship designed and built to carry aircraft. Originally intended to carry grain, it was purchased at an early stage of construction, and extensively modified by the Royal Navy to meet its concept of an ideal seaplane carrier. (LOC)



'seaplane' was coined by Winston Churchill, then in charge of the Admiralty.) Britain favoured seaplanes over flying boats (aircraft where the fuselage comprised the float) for carrier operations.

On 7 May 1913 the Royal Navy commissioned its first aviation ship. The old light cruiser, *Hermes*, launched in 1898, was converted to a seaplane carrier. Canvas shelters to hold aircraft were installed on the stern and forward of the bridge structure and aircraft-handling booms installed on the masts. (This pattern was frequently repeated with early seaplane carriers.) A launching ramp was added forward, extending over the bow. Trolleys to hold the floats allowed seaplanes to launch off the platform.

Hermes initially carried two aircraft, including one that Short built with folding wings. Between May and October, 30 successful flights were made from *Hermes*, two while *Hermes* was under way. These experiments, conducted during fleet manoeuvres, confirmed the usefulness of both seaplanes and seaplane carriers. *Hermes* was decommissioned in December 1913. Returned to service when World War I started, it was torpedoed and sunk in October 1914.

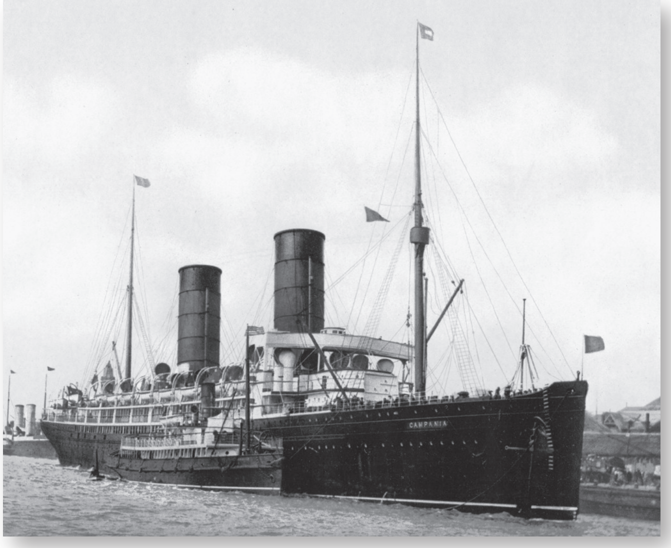
These experiments led the Royal Navy to construct a purpose-built seaplane carrier. In May 1914 an incomplete merchant hull was purchased. It had been framed, but was otherwise unfinished. Construction ceased until the Royal Navy delivered a plan for its dream aviation ship.

What resulted was *Ark Royal*. It had a large internal hangar, a hatch large enough to accommodate an aircraft, as well as all facilities associated with modern carriers: machine shops, custom fuel and stores storage, and an elaborate ballasting system to keep the ship level when handling aircraft. The anchor chains and ground tackle were placed below the upper deck allowing a flight deck to be added (although it never was).

The ship had one flaw, but it proved crippling – a top speed of 11 knots. The error was understandable. No one realized the threat submarines posed to slow-moving vessels when *Ark Royal* was designed. But it was too slow to sail with a battle fleet so, despite its advanced features, *Ark Royal* was doomed to serve in secondary theatres, operating from harbour.

With the start of World War I Britain accelerated the expansion of its seaplane carrier fleet. Within days of entering the war, the Admiralty requisitioned three fast Channel packets for conversion. Unlike the vessels converted by most other nations these vessels were fast, with top speeds of

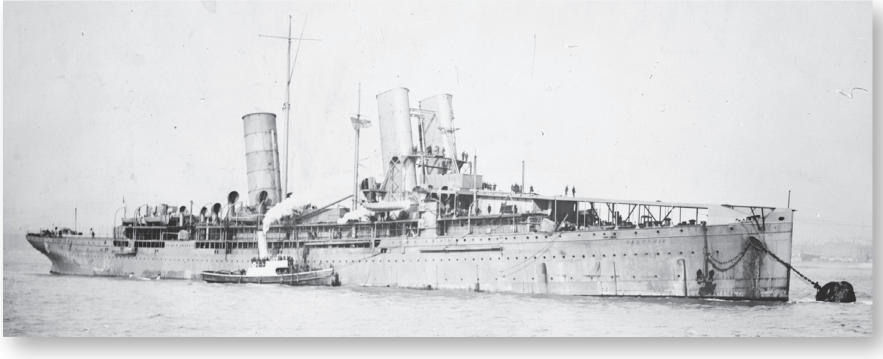
18 to 21 knots, and so they could keep up with the battle fleet if necessary. To speed their commissioning, their initial conversion was rudimentary; there were added canvas shelters fore and aft, aircraft-handling booms, and a few guns. One aircraft was stowed forward and two aft.


Campania started as a Cunard liner, and held the Blue Riband awarded to the ship completing the fastest Atlantic crossing in 1893 and 1894. By 1914 it awaited scrapping, but was saved by the start of World War I. (LOC)

Between September 1914 and January 1915 these three carriers – HMS *Riviera*, HMS *Engadine* and HMS *Empress* – served in this configuration. In the meantime another fast vessel, the Isle of Man packet *Ben-My-Chree*, had been purchased and was being converted into what would become the model for the Royal Navy's seaplane carriers. A large rigid hangar was added aft, and the forecastle had a launching platform installed to allow seaplanes to launch from the deck. *Ben-My-Chree*'s launch platform proved unsatisfactory and was subsequently removed. The rigid hangar worked so well that all three original conversions had their canvas shelters replaced with a rigid hangar aft. Except for a pair of slow cargo ships temporarily converted to seaplane tenders in 1915–16, no British seaplane carrier used canvas shelters thereafter.

A more extreme conversion was done on an old ocean liner, *Campania*. The ship, awaiting scrapping when the war started, was instead converted to a seaplane carrier. A launching ramp forward was installed and a large hangar, capable of carrying 12 aircraft aft. Operation experience proved the launching ramp was too short. It was lengthened, starting aft of the forward funnel. The funnel was split, with aircraft rolling between the funnels on take-off. A floatplane was designed to operate from *Campania*, the Fairey F.17 Campania, which was the first aircraft designed to operate off a specific ship.

The next four aviation vessels commissioned for the Royal Navy combined the best features of *Ben-My-Chree* and *Campania*: a large rigid hangar aft and a launch platform forward. These became known as mixed carriers, a cross between a seaplane carrier that placed its aircraft in the water for launch and a true aircraft carrier, from which aeroplanes could take off and land. Two, *Vindex* and *Manxman*, were converted from Isle of Man fast packets, and joined the fleet in late 1916. The other two were fast cargo


For most of its career as a seaplane carrier, *Campania*'s forward funnel was split, with the flying-off deck running between the two halves to permit a longer take-off run. It gave *Campania* a unique appearance. (IWM, SP 114)

A HMS *ARK ROYAL*

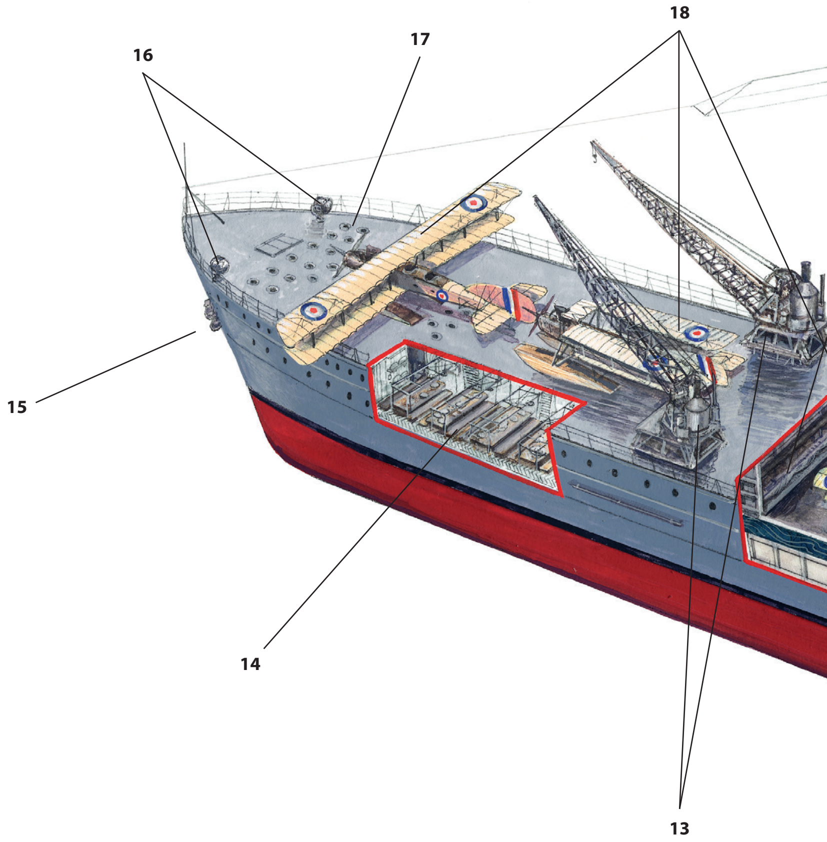
Ark Royal was the world's first ship designed and built to carry aircraft. Some call it a merchant conversion. That is only as accurate as calling Flower-class corvettes merchant conversions because the corvettes were adapted from whale catchers. It is true that *Ark Royal*'s hull came from a bulk carrier intended to carry coal and grain, and the ship's keel was laid down and hull framed before the Royal Navy purchased it in May 1914. But the Royal Navy designed everything inside.

The machinery, funnel and superstructure, originally amidships, were shoved aft. An aircraft hangar spanned most of the forward two-thirds of the ship. It contained workshops for servicing aircraft and their engines, and storage space for aircraft spare parts, lubricants, fuel and ordnance. The hangar held eight aircraft, sheltering them from the elements.

A sliding hatch amidships, 40ft by 30ft, gave access to the hangar. Aircraft were lifted from the hangar and into the sea by five-ton cranes on either side of the hatch. *Ark Royal* was also equipped with a set of ballast tanks to stabilize the ship when handling aircraft, although these proved unnecessary and were never used.

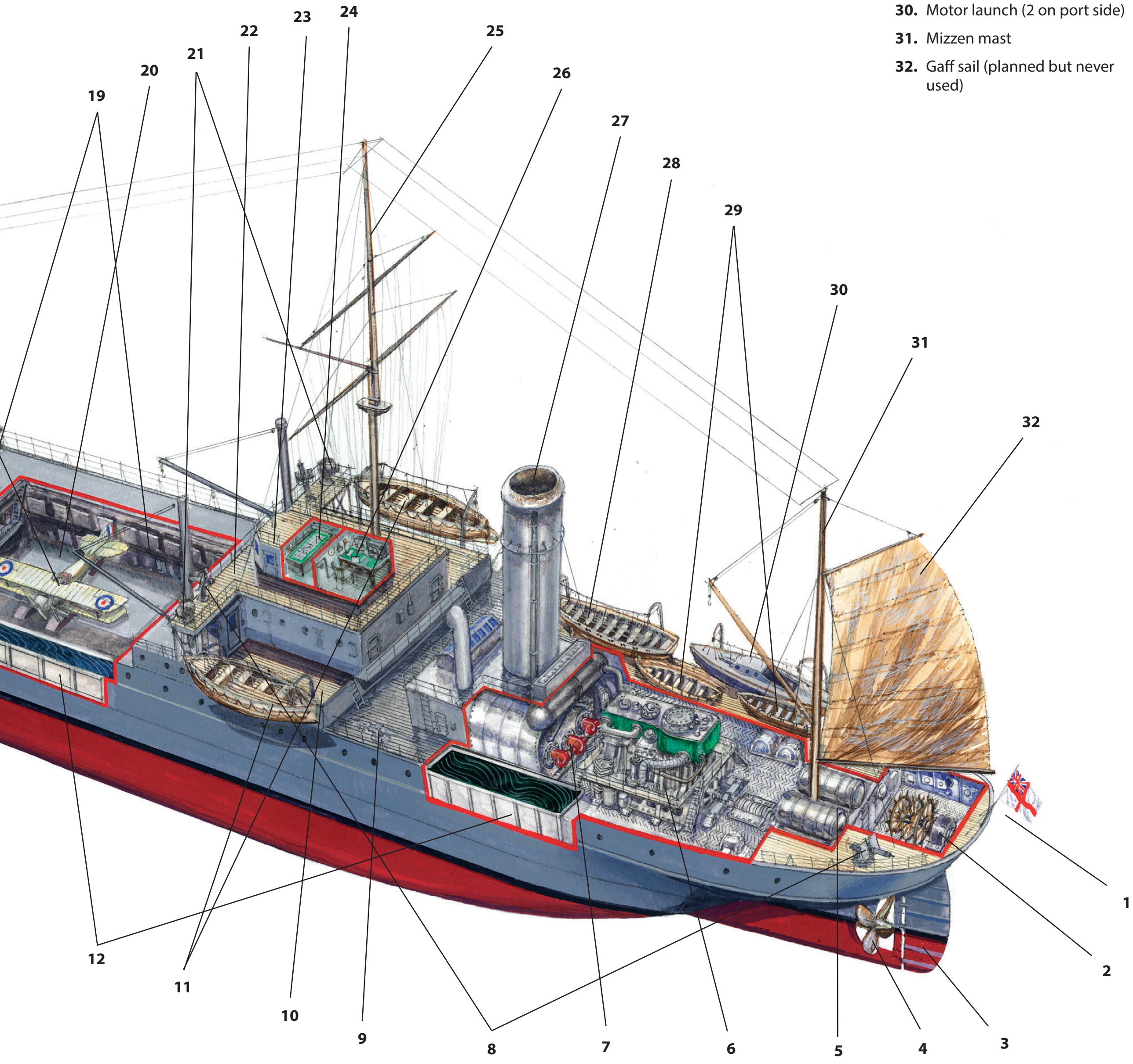
The anchor chains ran on a deck, between the upper deck and the hangar deck. This left the upper deck clear for an aircraft-launching ramp. Despite plebeian origins, *Ark Royal* was one of the most technologically advanced warships of its era.

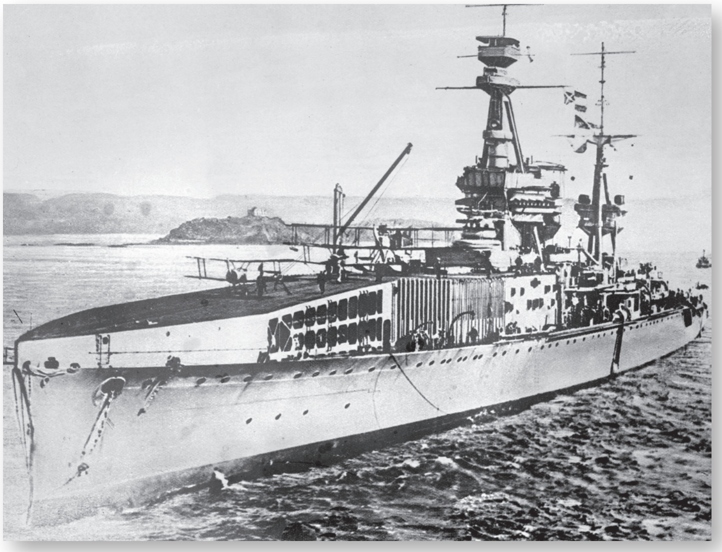
Ark Royal was not a super-ship. An experiment, built from brief experience handling aircraft at sea, its biggest flaw was slow speed: 11 knots. It could not operate with the battle fleet, which cruised at 18 knots. Its slow speed also left it dangerously vulnerable to U-boats, an unrealized menace when it was designed. Despite this *Ark Royal* was the model for all future aircraft carriers, from World War I's *Argus* through to the 21st-century Nimitz-class nuclear carriers.



KEY

1. Flagstaff
2. Emergency steering flat
3. Rudder
4. Propellor
5. Dynamos
6. Engine/engine room
7. Boilers/boiler room
8. .303 machine guns
9. 3-pdr quick-firing gun (one on each side)
10. Boat deck
11. Whalers
12. Water ballast tank
13. 5-ton cranes
14. Crew space/mess deck
15. Anchor
16. 24in searchlights
17. Flying deck
18. Aircraft (3 shown)
19. Workshops
20. Aeroplane hold
21. 24in searchlights
22. Bridge
23. Wheelhouse
24. Chart house
25. Main mast
26. Wireless room
27. Smokestack
28. Cutter
29. Dingies
30. Motor launch (2 on port side)
31. Mizzen mast
32. Gaff sail (planned but never used)





As first completed HMS *Furious* was a larger, faster version of *Campania*, with a flying-off deck forward, but no landing deck. It retained its original single-gun 18in gun turret aft, although how useful the gun would be was questionable. (LOC)

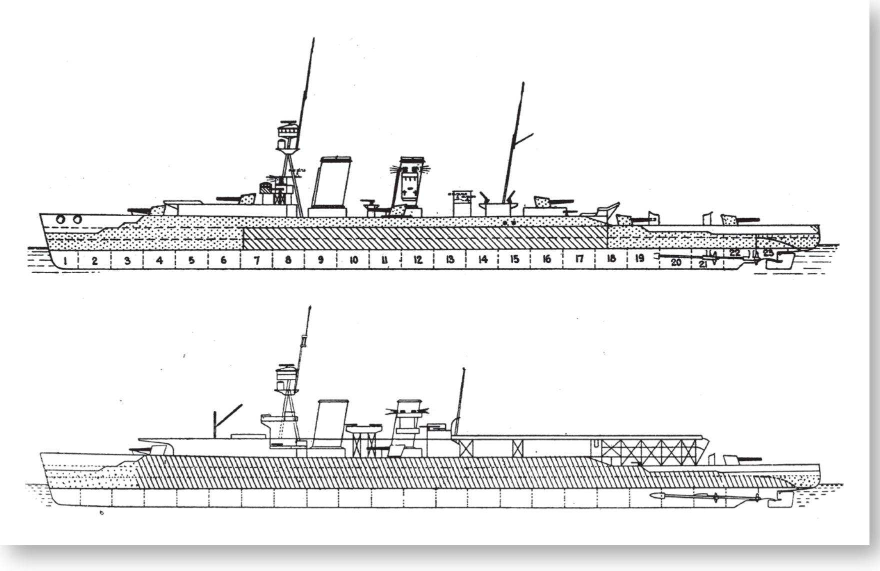
ships taken over while building. These ships, *Nairana* and *Pegasus*, were completed and commissioned by mid-1917.

Mixed carriers operated a mixed set of seaplanes and landplanes. The landplanes with their higher performance intercepted Zeppelins or conducted other high-value missions which justified the potential loss of the aircraft. After the mission these aircraft flew to a land base or ditched – possibly to be recovered and repaired, but typically lost.

Another mixed carrier which joined the fleet in 1917 was HMS *Furious*. It was one of three 'large light cruisers' ordered in 1915 by Jackie Fisher, First Sea Lord at the war's outset. These were lightly protected, shallow-draft ships mounting dreadnought guns, intended for a questionable Baltic invasion of Germany. The scheme disappeared with Fisher's departure from the Admiralty, but the ships did not. *Furious* was to be armed with two single-gun 18in turrets.

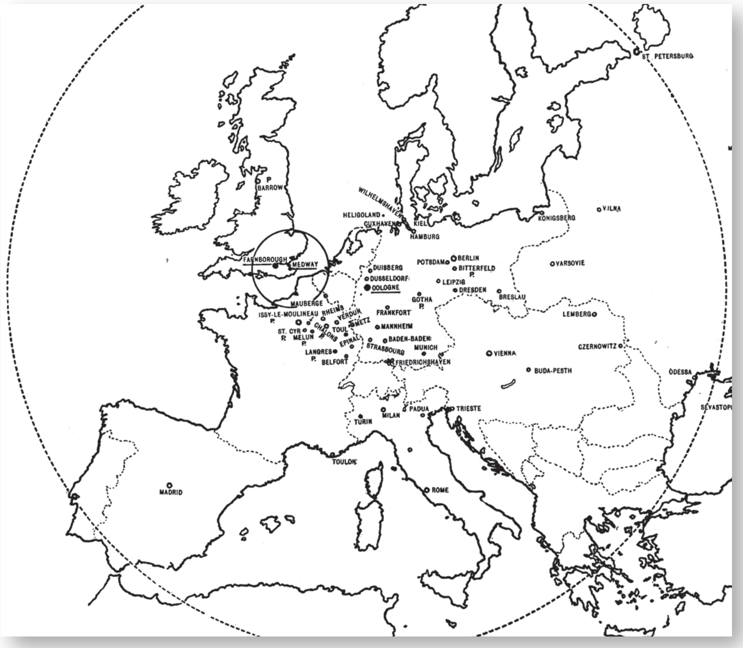
Admiral David Beatty, commanding the Battle Cruiser Fleet, wanted an aircraft vessel capable of keeping up with the battlecruisers, and preferably one capable of operating conventional aircraft. *Furious*, no longer required for its intended role, but capable of a 30-knot sustained speed, fitted the bill. As originally converted *Furious* had a flying-off deck forward with a hangar beneath it, but retained its aft 18in gun turret. It carried eight aircraft: five Sopwith Pups and three Short 184 seaplanes.

With no landing-on deck on *Furious*, once launched the Pups could only either fly to land or ditch in the sea. One daring pilot managed to land a Pup on the flying-off deck through the expedient of flying alongside *Furious* and



HMS *Vindictive* (bottom) was intended as a copy of the *Furious* on a smaller scale. It began as a Hawkins-class cruiser (top). Originally to be named *Cavendish*, it was renamed *Vindictive* for the cruiser expended in the Zeebrugge raid. (AC) side-slipping onto the flying-on deck, but this was impractically dangerous. He was killed repeating the experiment.

In November 1917, *Furious* returned to the builder's yard for further modification. The after turret and mainmast were removed, and a 576ft × 90ft landing-on deck installed behind the smokestack. A large hangar was also added under this deck. Up to 60 aircraft could now be stowed in the two hangars. Two elevators permitted aircraft to be quickly transferred from hangar to deck and gangways on either side of the superstructure permitted aircraft to be moved from the landing-on deck to the flying-off deck. When *Furious* returned to the fleet in March 1918, Britain had its first true aircraft carrier.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POTSDAM
BERLIN
BITTERFELD
VARSOVIE
DUISBERG
DUSSELDORF
COLOGNE
LEIPZIG
DRESDEN
BRESLAU
GOTHA
MAUBERGE
ISSY-LE-MOULINEAU
RHEIMS
VERDUN
FRANKFORT
LEMBERG
ST. CYR
CHALONS
TOUL
METZ
MANNHEIM
MELUN
EPINAL
BADEN-BADEN
STRASBOURG
MUNICH
CZERNOWITZ
LANGRES
BELFORT
FRIEDRICHSHAVEN
VIENNA
BUDA-PESTH
ODESSA
TURIN
MILAN
PADUA
TRIESTE
SEVASTOP
TOULON
MADRID
ROME

This figure illustrates why Britain needed fast aviation ships but the Central Powers did not. The large dashed circle shows the operational range of a Zeppelin in 1914. The small circle shows that of a seaplane. (AC)

Two other aircraft carriers were concurrently being built. One was built on a converted Hawkins-class light cruiser. Large warships, the Hawkins class was intended to hunt down German surface raiders, but these ships no longer existed by the time the Hawkins class neared completion. As with *Furious*, the Royal Navy experimented with creating a carrier from the unneeded hull. HMS *Vindictive* was a miniaturized version of *Furious*, with flying-off and landing decks separated by superstructure. Unfortunately, the ship's flight decks were too small, especially the landing-on deck. Appearing a month before the war's end, it remained a carrier for only a few years before reconversion to a cruiser.

Nor was *Furious* a completely satisfactory ship. The superstructure and smokestack exhaust created turbulence which made landing hazardous. An additional hazard lay in the superstructure, waiting for any aircraft which overshot.

The ultimate solution lay in the uncompleted hull of the fast merchantman *Conte Rosso*, quadruple-screwed and nearly 16,000 tons. Originally intended to be completed as a typical mixed carrier, in 1916 it was decided to convert it to a true aircraft carrier – HMS *Argus*. After several designs were considered, the ship was built with a flush flight deck above a hangar deck. Exhaust was routed through trunked ducts dumping gas off the sides aft. Except for having an island on the side of the deck, the resulting design was the pattern used by aircraft carriers for over a century.

The Central Powers

The Central Powers – Germany, Austria-Hungary, and Turkey – invested minimally in shipboard aviation during World War I. While keenly interested in aviation, they concentrated on the shore-based version because of their geography, the secondary role their navies played relative to their armies, and their lack of a need to project power by sea.

Germany had a naval air service and some of its pilots are shown in this photograph. Most flew seaplanes or flying boats operating off bases on beaches or in harbour. German seaplane carriers tended to operate in sheltered waters. (AC)

Turkey and Austria-Hungary never deployed aviation vessels. Turkey's navy was hopelessly outclassed by Russia's Black Sea Fleet and the Franco-British Allies in the Mediterranean and Aegean. Austria-Hungary stood on the defensive in the Adriatic. Both nations kept their surface forces within a few hours' steaming from their coast. Aerial support, including support from floatplanes or flying boats, could be provided by shore-based aircraft.

German naval doctrine prior to World War I was based on repelling a close naval blockade by either France or Britain. Battles were expected to be fought within range of shore-based aircraft. Long-distance maritime reconnaissance could be done with Zeppelins.

However, when the war started the Imperial German Navy had just one operable Zeppelin (two others had crashed), and the Royal Navy instituted a distant blockade, well out of range of shore-based aeroplanes. Germany accelerated Zeppelin construction and experimented with seaplane-carrying ships. Yet the Germans never pursued seaplane carriers with the intensity of the Royal Navy.

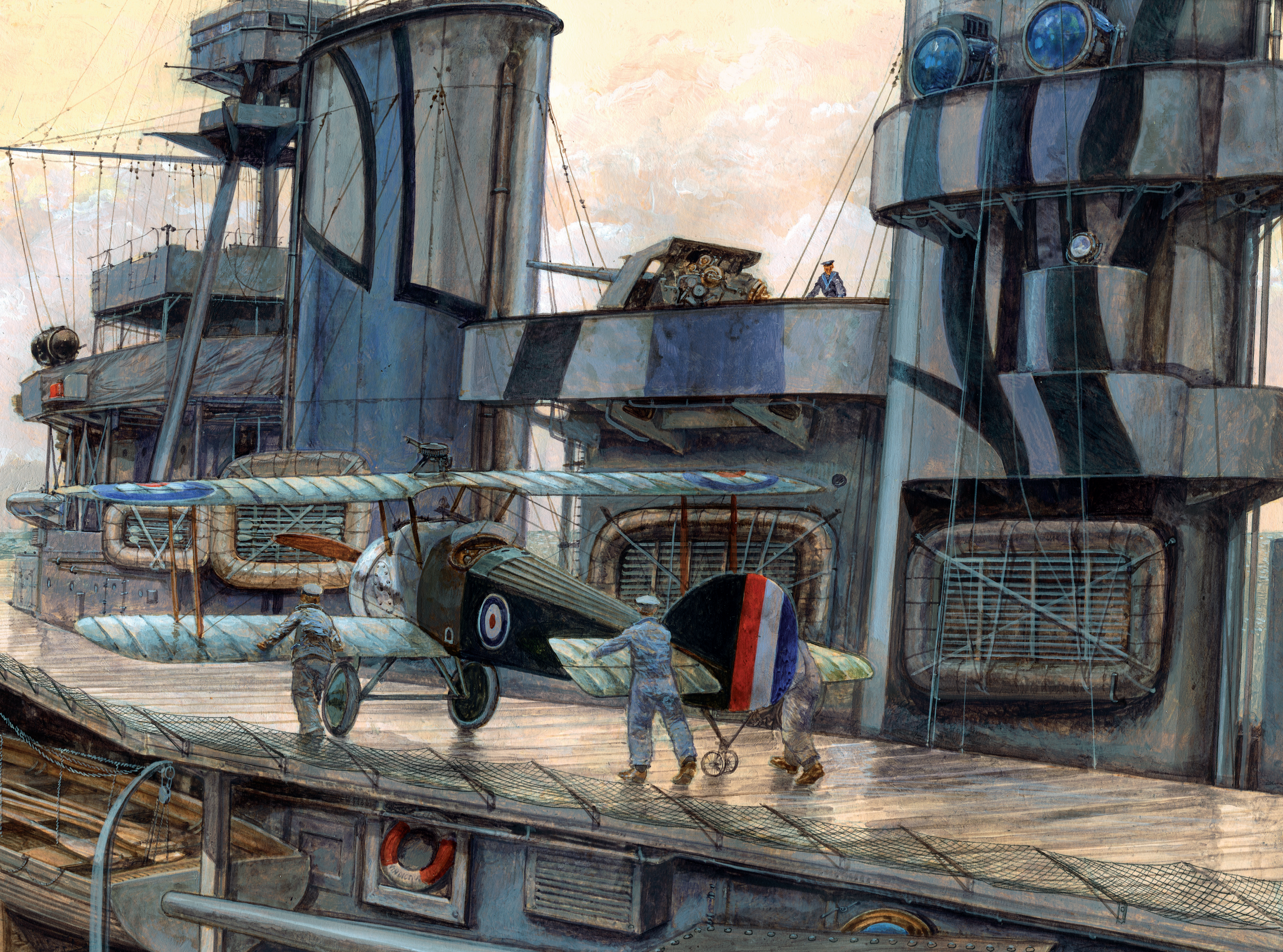
B

TRANSFERRING FROM LANDING-ON DECK TO FLYING-OFF DECK

A major drawback of the split-deck carriers with superstructure separating the flying-off and landing-on decks was getting aircraft from the aft deck to the forward deck. The challenge existed even when these ships were being used to ferry aircraft rather than for carrier operations with the aircraft intended to land back on the ship. Over half the aircraft carried were stored in the aft hangar.

The solution was to build gangways wide enough for the aircraft landing gear connecting the two decks. Of course, the gangways had to be far enough from the superstructure sides so the aircraft's wings could clear any bulkheads. This meant they had to be built well over the ship's side. *Furious*, a beamy 88ft wide, had two gangways, one to port and one to starboard. *Vindictive*, shown here, was considerably narrower, with a width of only 61ft. To reduce top-hamper only one gangway was installed, along the ship's port side. To allow its aircraft to clear the smokestacks and bridge, the gangway had to run over the port broadside 7.5in gun turret.

A gang of ground crew would push the aircraft forward along the gangway, as shown in this plate. It required men on either side of the cockpit to push the plane. Perhaps a couple of men would lift the tail so the tailskid cleared the gangway. The railings on the gangway had to be low enough to allow the lower wing to clear the rails, making walking on it in inclement weather or heavy seas hazardous. Additionally, the wings of the Sopwith or Beardsley aircraft carried aboard *Vindictive* barely cleared the bridge and conning tower when the aeroplane went past. The advantages of the flush-deck design used by *Argus* were plain to anyone who served on *Furious* or *Vindictive*.


VINDICTIV

Foudre was converted to a seaplane carrier in 1912, a year before *Hermes*, but did not launch aircraft from its deck until May 1914, and then only from anchor. *Foudre* is shown at Spalato (Split) Yugoslavia, in 1919. (USNHHC)

As with Britain, Germany initially converted merchant vessels to their seaplane carriers. Britain almost exclusively converted fast packets or liners, but Germany followed a different course. Germany chose large, roomy, and slow cargo-passenger liners. These were modified to a similar pattern. Two canvas hangars with side exits were added over cargo holds to house seaplanes. Each hangar housed one seaplane, although later in the war the hangar framework was strengthened to allow a seaplane to be stored atop the hangar. One hangar was placed forward and one aft of the central superstructure. Cranes for handling seaplanes, a pair of deck guns, and storage for supplies and aviation fuel completed the conversion.

These ships were intended to operate in sheltered waters, carrying their seaplanes from harbour to harbour. None could launch seaplanes while moving. All had a maximum speed of 10 to 11 knots and were incapable of steaming with the battle fleet, although all eventually saw operational service in the Baltic Sea.

Progress on the conversions was slow. Work started on three ships in August, 1914. The British-flagged *Glyndwr*, seized while in Danzig, was the first to be commissioned – in January 1915. No hangars were installed, because it was intended as a platform for training seaplane pilots. Two other seaplane carriers, *Answald* and *Santa Elena* joined the fleet in July 1915, their conversion taking a year. Their hangars as originally installed left the ships dangerously unstable and a lengthy modification followed. By contrast, *Engadine*, *Riviera* and *Empress* were all operational in one month.

Germany expanded its seaplane carrier force in 1918 by converting another interned merchantman, *Oswestry*, along the same lines as earlier carriers. It entered the fleet as *Oswald* in July 1918. Additionally the *Adeline Hugo Seinnes 3*, an unarmed naval auxiliary, operated seaplanes without being modified.

While Germany operated seaplanes off warships as early as November 1914, none were modified to carry seaplanes. The aircraft were simply tied down where convenient and lifted in and out of the water using boat handling booms. Not until 1918 did Germany actually convert a warship into a seaplane carrier, modifying the Stettin-class light cruiser *Stuttgart*. Six of its 10.5cm guns were removed, and the forward guns replaced with 8.8cm anti-aircraft guns. A large steel-framed canvas hangar and derricks for handling seaplanes were added aft. Germany finally had an aviation ship capable of keeping with the fleet, albeit not until May 1918.

SMS *Stettin* and the armoured cruiser *Roon* were also to have been converted, but work never started. Neither ship was considered for conversion until late 1917. By then naval operations had lost priority. *Stettin*'s conversion may have been abandoned because it, like *Stuttgart*, could carry only two or three aircraft, insufficient for scouting. *Roon* would have held four to six aeroplanes, but the ship was elderly, and Germany was sliding into crisis. *Stuttgart* was the only aviation ship operated by the German navies in either world war.

The Mediterranean Powers: France and Italy

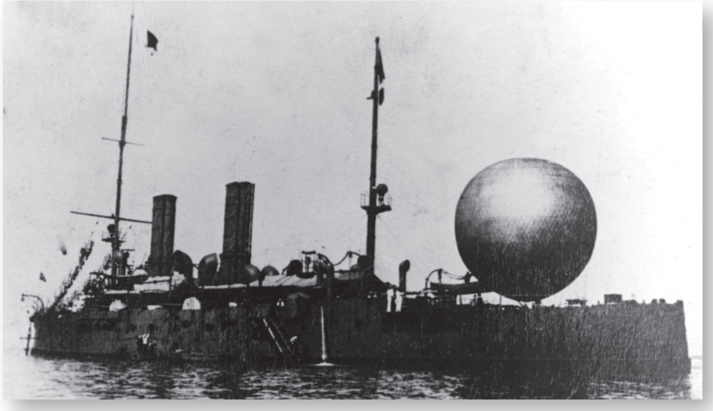
Throughout most of the 19th century France held the title of Britain's chief naval rival, driving naval innovation. By the first decade of the 20th century, Germany supplanted France as Britain's largest potential rival, and the United States' battle fleet was already larger than France's. Regardless, entering World War I France still attempted to maintain its leadership in naval innovation, including naval aviation. Its *Marine nationale* commissioned the world's first dedicated aviation ship in 1912.

The ship was *Foudre*, a ship which could have emerged from a steampunk tale. Rated as a cruiser, it was built to carry 12 torpedo boats, which would be launched before a battle. The concept proved impractical. *Foudre*, launched in 1895, spent 17 years in a variety of miscellaneous roles. The ship was relatively fast, contained repair and maintenance shops (originally intended for its torpedo boats), and it was available. In 1911, when Britain began its first tentative experiments with launching aircraft from ships, France decided to convert *Foudre* to a seaplane carrier.

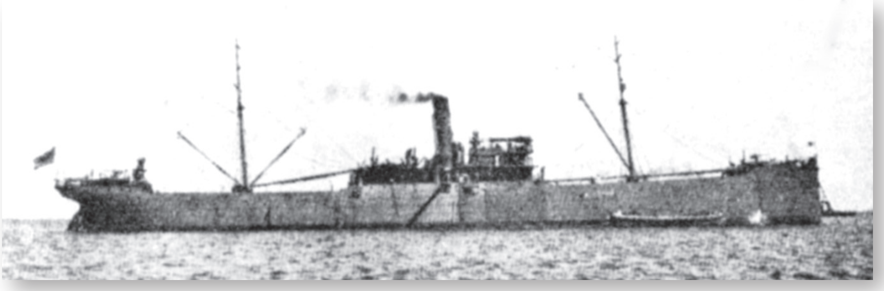
Extensive modifications were made. A permanent hangar for seaplanes was placed in the forward half of the space originally allocated for storage of the after set of torpedo boats. The rest of the space was converted to a seaplane-handling platform. The bridge was relocated to just forward of the first funnel, and a take-off platform erected over the forward third of the deck. Additional seaplanes could be accommodated aft of the mainmast.

The conversion was completed in March 1912. By May *Foudre* was operational. It spent the next two years as an aviation test bed, sailing with the fleet and operating aircraft in pre-war aviation manoeuvres. Two launches were attempted from the take-off platform in May 1914, with one ending in a crash. The take-off platform was subsequently removed and replaced with a seaplane-handling platform which also allowed more aircraft to be carried.

France entertained ambitious plans for naval aviation between 1912 and 1915. The Marine nationale planned to purchase a tanker, *Fornebu*, to be converted into a seaplane carrier. The design resembled *Ark Royal*, with the superstructure aft, and the forward deck clear, but it was an independent development of the same concept.



Italy's first experiments with shipboard aviation were conducted using the protected cruiser *Elba* as a platform for tethered balloons in 1907. *Elba* later served as a mother ship for floatplanes, its chief recommendation being that it was too useless for any other service. (USNHHC)



Wakamiya was Japan's only seaplane carrier during World War I. It was rebuilt in 1915 and after World War I a flight deck was added forward, so Japan could experiment with launching aircraft from ships. (AC)

Plans were drawn up to equip battleships and cruisers with catapults for launching seaplanes and develop systems for landing aircraft on ships.

World War I interrupted these visions. Faced with an invasion crisis, virtually all industry turned to support the army. France suspended naval construction of all ships larger than a destroyer for the duration of the war. Its naval efforts were largely confined to the Mediterranean.

France commissioned three more seaplane carriers during World War I, civilian vessels converted along the lines of the German seaplane vessels: canvas hangars over cargo holds and cranes for handling seaplanes. One seaplane carrier, *Campinas*, spent the war in the Mediterranean along with *Foudre*. The other two conversions were small paddlewheel Channel packets, converted for anti-submarine patrol in the English Channel.

Italy's pre-war development of naval aviation was more tentative than Britain's or France's. Italy established a naval air arm in 1913, but its aircraft, mostly flying boats, operated from shore bases. During 1913 Italy experimented with carrying seaplanes on warships once or possibly twice, but did not follow up on the experiment.

Italy converted an elderly protected cruiser, *Elba*, to an aircraft depot ship in 1914. Modifications were minimal and it operated only three seaplanes. The ship operated from the port of Brindisi, but was retired in 1916, despite Italy being at war.

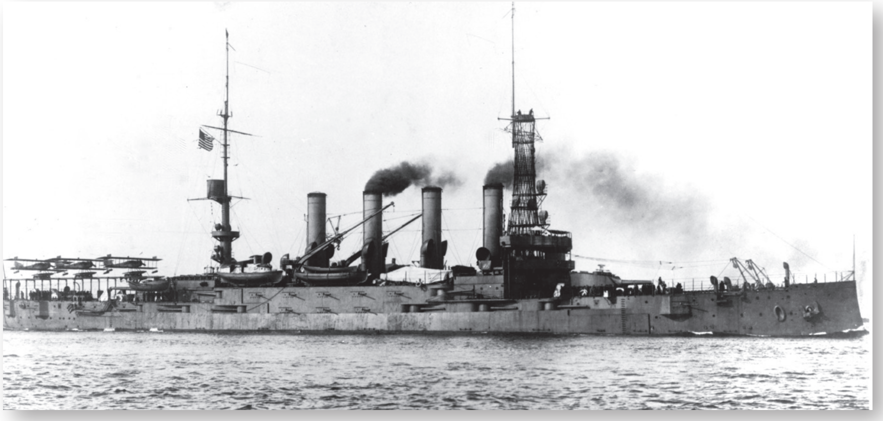
Italy commissioned only one other seaplane carrier. *Europa* began as a large cargo liner, purchased for the Italian *Regia Marina*. It underwent a typical, albeit extensive, conversion, with seaplane hangars added fore and aft. While the hangars had canvas sides, they were large, and used a robust girder structure for framing. Like most non-British merchant conversions *Europa* was slow, and operated from harbour, more as a depot than as a seaplane carrier. But unlike most merchant conversions, which could carry only two to four aircraft, *Europa* could accommodate eight within its hangars.

Japan, Russia and the United States

Three other nations operated seaplane carriers – of a sort – during World War I: Japan, Russia and the United States.

Japanese use of seaplane carriers in World War I was limited to the *Wakamiya*. It was a merchant conversion following the same lines as many of those of Germany, France and Italy: a single-screw cargo vessel between 7,000 and 10,000 tons displacement, capable of steaming at 9 to 11 knots. It was a groundbreaking ship, because it set several firsts, including the first such conversion completed and the first to be used for combat.

Wakamiya Maru was captured during the Russo-Japanese War of 1904–05, and kept as a prize by the Japanese. When the Imperial



Between 1915 and early 1917 the United States Navy installed aircraft catapults on three old armoured cruisers: *North Carolina*, *Seattle* (pictured here), and *Huntington*. The catapults were removed after the United States entered the war. (USNHHC)

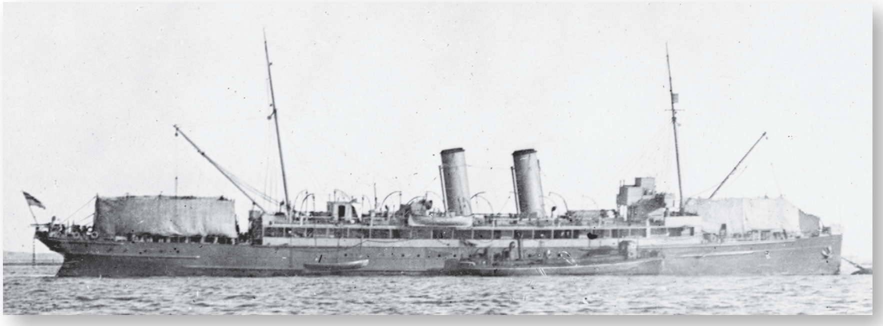
Japanese Navy first began experimenting with naval aviation in 1913, it used the old prize, unmodified, to host two Maurice Farman seaplanes bought in France. In early 1914 canvas hangars were added over the two holds, and its cranes modified to handle seaplanes. It could carry four aircraft.

Wakamiya allowed Japan to project air power, despite its rudimentary capabilities. Japan's desire to project power in World War I was limited to the China Sea and Western Pacific Ocean, and once Japan controlled Germany's Asian and Pacific possessions it had achieved its war goals, and saw little need for a major expansion of navy or army. *Wakamiya* experienced several additional modifications, including the addition of a take-off platform in 1920, but was chiefly used as an aviation test bed.

The United States' contribution to shipboard aviation was even more meagre than Japan's. After achieving the world's first take-off and landing from a ship with Eugene Ely's flights in 1910 and 1911, it ignored shipborne aviation. The man then heading the US Navy's procurement department felt dedicated aviation ships were floating garages, to be avoided.

The Veracruz Incident in 1914 forced reconsideration of that belief. Aerial reconnaissance was needed, but no one wanted fragile aircraft or volatile gasoline on battle-line ships. The solution was to carry a seaplane and a flying boat on a superannuated battleship, USS *Mississippi*. Operating the aircraft from the unmodified battleship proved so awkward that the aeroplanes were transferred to shore, and *Mississippi* was subsequently sold to Greece.

Almaz was built for the Imperial Russian Navy as the Viceroy's yacht in the Far East, but also to serve as a scout cruiser. A veteran of Tsushima, after the Russo-Japanese War it was reassigned to the Black Sea. (USNHHC)



Riviera was one of three cross-Channel ferries hastily converted to seaplane carriers in August, 1914. When it participated in the Christmas-day Cuxhaven raid it had canvas hangars fore and aft. It was later rebuilt with a rigid hangar aft. (IWM, SP 1927)

In 1915, the US Navy again experimented with shipboard aviation, modifying *North Carolina*, *Seattle*, and *Huntington*, elderly but still-swift armoured cruisers. A catapult was added aft and two to three seaplanes assigned to each cruiser. Although the ships successfully launched and recovered aircraft (including launches under way), the arrangement proved too cumbersome, and blocked the rear turret. Shortly after the United States entered World War I, the catapults were removed, and the ships reverted to standard armoured cruisers.

Russia broke the mould of indifference, however. It enthusiastically embraced ship-based aviation to an extent surpassed only by Britain. This is less surprising than it may seem today, since the Imperial Russian Navy had been experimenting with ship-based balloons and blimps since the early 1890s. Russia was an early adopter of heavier-than-air craft, during a period when the small size of aircraft and aviation meant an aircraft industry would not overtax Russia's meagre industrial capacity.

In the Baltic it followed the pattern of virtually every other navy, converting a slow merchantman by adding canvas hangars and extra booms. The Black Sea saw a far different model. With Turkey, Russia's Black Sea Fleet faced an opponent with a long exposed coastline and a much weaker navy. Between January and March 1915 it converted three large, fast, twin-screw ships into seaplane carriers.

One, *Alamaz*, was a warship, an odd yacht-cruiser intended as a vice-regal yacht during peacetime and a scouting cruiser in war. Fast and sturdy, yet out of place in the battle line, it was perfect for launching independent hit-and-run airstrikes. The other two, brought into the Russian Navy as *Imperator Nikolai I* and *Imperator Alexandr I*, were cargo liners trapped in the Black Sea by the war. Without another Russian use for these vessels, they too, became seaplane carriers.

Changes to all three were minimal. Booms capable of handling seaplanes were added to the masts and 6in and 3in guns were installed on the liners. Fuel-handling and aircraft servicing equipment completed the conversion. Their aircraft were carried on the deck, unsheltered. When Romania entered the war on Russia's side in 1916, one more fast transport, *Ruminia*, was similarly modified and operated with the Russian fleet.

As basic as the modifications were, they gave Russia an offensive aerial capability unmatched by any power except Britain. The aviation fleet could sortie, sail across the Black Sea, unload its aircraft, launch an airstrike, recover its aircraft, and return to port before the Turkish navy could respond. The only Turkish ship fast enough to catch these seaplane carriers and strong enough to reliably destroy them was *Sultan Selim* (ex-German battlecruiser *Goeben*).

OPERATIONAL HISTORY

1914–15

When World War I was declared, exactly two commissioned naval ships were outfitted to carry seaplanes: France's *Foudre* and Japan's *Wakamiya*. The Royal Navy had restored *Hermes* to its cruiser configuration and *Ark Royal* was a month from launching. Germany, Austria-Hungary and Russia (the other belligerent powers at the war's outset) had none, nor did still-neutral Turkey. Italy, which would enter the war in 1915, had converted an ancient light cruiser to serve as a depot ship for seaplanes, but it was more of a floating dock than a seagoing vessel.

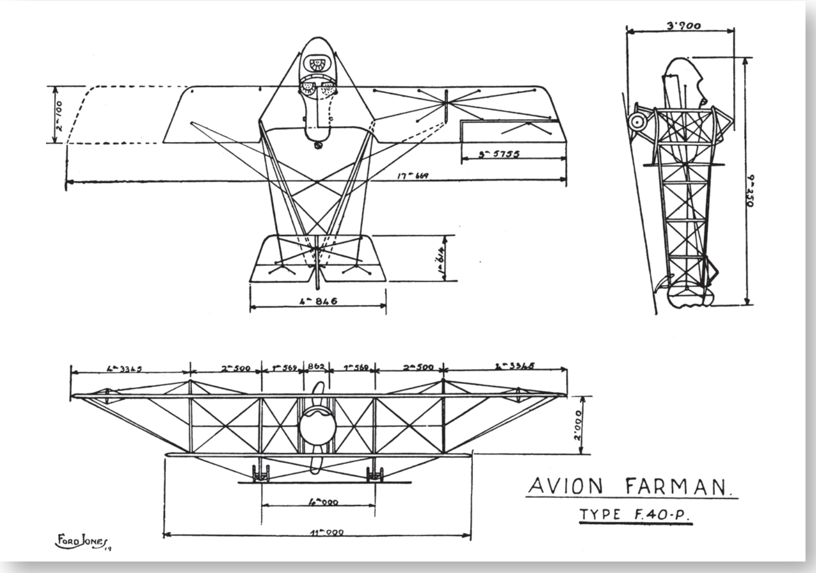
Two navies, Germany and Britain, immediately began to add seaplane carriers to their fleets. Believing seaplanes deployed from ships could supplement seaplanes operating from island bases in the North and Baltic Seas, on 3 August 1914, Germany requisitioned two large but slow cargo ships to convert into seaplane carriers. A week later the Royal Navy requisitioned three fast Channel packets, *Engadine*, *Riviera* and *Empress*, for the same purpose.

Hermes was recommissioned on 31 August as a fast transport and supply ship, rather than as a seaplane carrier, but retained its aviation equipment. Whether it would have been used as a seaplane carrier is a question that cannot be answered, for it was torpedoed and sunk by U-27 on 31 October 1914. Thus exited Britain's first seaplane carrier.

The Royal Navy's new vessels all entered service by the first week of September, but Germany experienced difficulty with its conversions, not achieving a seaworthy arrangement of gear until January 1915. Neither vessel, *Answalt* and *Santa Elena*, joining the High Seas Fleet until July 1915. But even as the first seaplane carriers joined the Royal Navy, halfway around the world Japan made the first carrier airstrike.

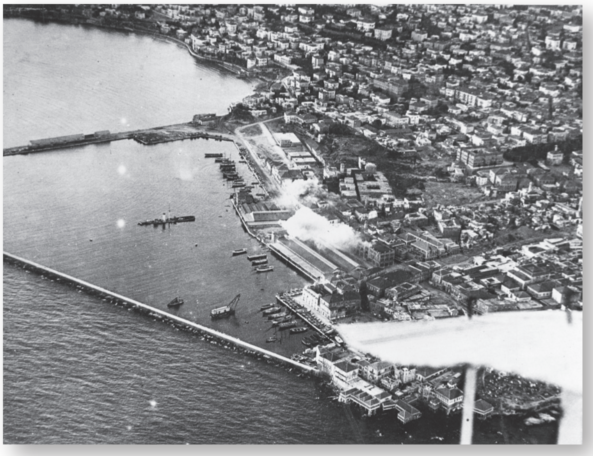
Wakamiya entered the Imperial Japanese Navy as its first seaplane carrier in July 1914. Japan declared war on Germany on 23 August and on Austria-Hungary on 25 August. This gave an opportunity to test *Wakamiya* in combat. The ship, carrying four Maurice Farman seaplanes was sent to support the Japanese siege of the German naval base at Tsingtao, China.

On 6 September 1914, a seaplane launched from *Wakamiya* flew over Tsingtao, carrying bombs. It spotted the Austrian cruiser *Kaiserin Elizabeth* and targeted it. The hand-held bombs were small and missed, but it was the first time in history that naval aircraft had attacked ships. *Wakamiya*'s seaplanes continued supporting the siege until the Germans surrendered on 6 November. They operated from shore



For the Tsingtao campaign, *Wakamiya* operated three Maurice Farman pushers like these. When operating off the ship as seaplanes, floats were added to the landing gear, but they could also operate on land, with the floats removed. (AC) after 30 September, when *Wakamiya* was damaged by a mine and returned to Japan for repairs.

In December, it was Britain's turn to launch a carrier strike. On 25 December 1914 seven aircraft launched from *Engadine*, *Riviera* and *Empress* attacked the Zeppelin base at Cuxhaven. The raid's primary goal was to blind Germany's High Seas Fleet. Admiral von Tirpitz needed Zeppelins for fleet scouting, but by December 1914 Germany had only 6 in commission. Zeppelins required large storage sheds, which were therefore easily targeted, but the only way aircraft could get close enough to strike was by sea.



Royal Naval Air Service aircraft operated off British seaplane carriers in the Levant. This photograph shows an air raid on Beirut, Lebanon by aircraft from the carrier forces operating out of Port Said. Hits from two 60-pound bombs can be seen. (USNHHC)

The British aircraft, launched in fog, quickly became separated. Only one aeroplane found the German fleet. Another sighted and attacked a German destroyer. Another spotted two German cruisers. Others wandered around lost, eventually jettisoning their bombs. One of the jettisoned 20-pound bombs struck a Zeppelin shed. It was a lucky, accidental hit.

Of the seven aircraft, only two were recovered by the seaplane carriers. One ditched near the Netherlands, its crew recovered by a Dutch trawler. Three others landed near British submarines. The planes were destroyed, but the crews saved.

The raid's best-known participant was Erskine Childers, aboard one raiding aircraft as an observer. The author of spy thriller *The Riddle of the Sands* was a lieutenant in the Royal Naval Volunteer Reserve in 1914. The Cuxhaven raid accomplished little. Regardless, it was the ancestor

C

FIRST AIR STRIKE 1914

Germany's primary holding in China was its concession at Tsingtao (Qingdao today), a fortified naval base, and the port from which its Far Eastern squadron operated. Japan's primary objective after declaring war on Germany was its capture. A Japanese fleet arrived on 27 August, instituting a close blockade of Tsingtao. On 2 September it was joined by Japan's only seaplane carrier, *Wakamiya*, which anchored in Kiaochow (Jiaozhou) Bay.

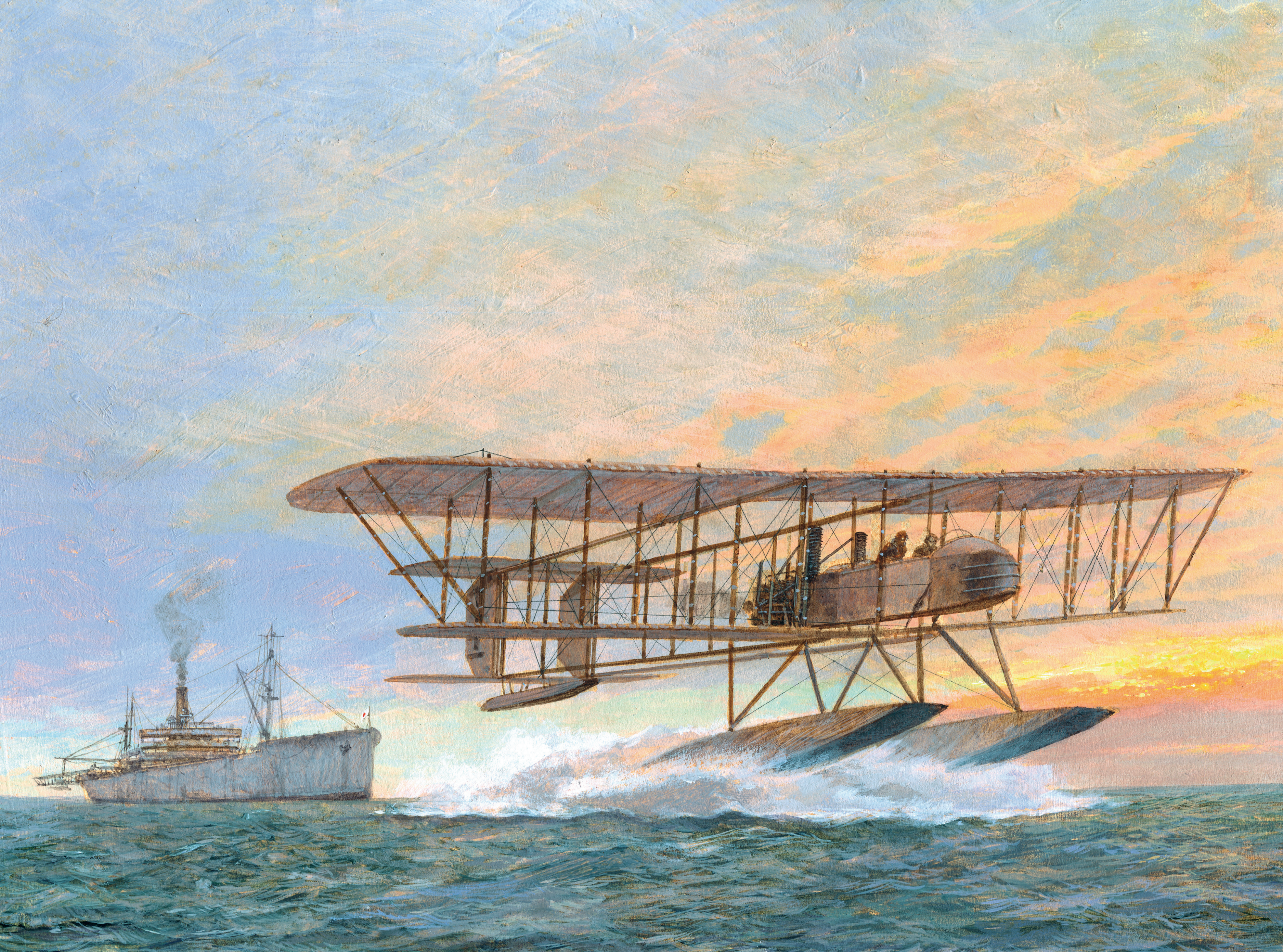
Wakamiya carried four Maurice Farman Type F aircraft. A pusher design seating a pilot and observer, they were converted to seaplanes by adding floats to the landing gear struts. In addition to the crew, they could carry a few bombs, converted from naval artillery shells. By modern standards – or even those of two years later – the Farmans were primitive. However, they were far more capable and powerful than the two German Taube aircraft at Tsingtao, and gave Japan air superiority.

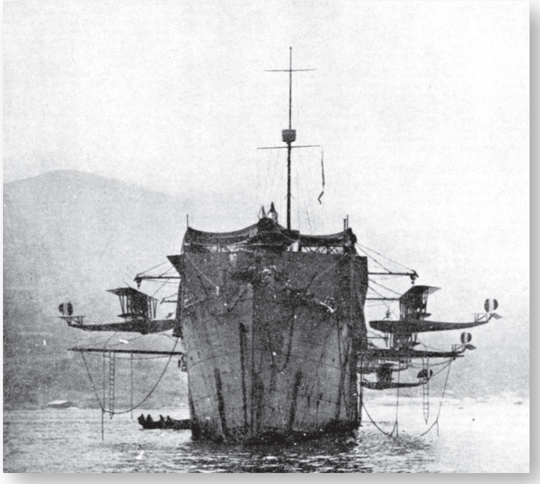
Three days after arriving, on 5 September, *Wakamiya* launched a reconnaissance mission, sending a Farman over Tsingtao. It returned, reporting that most of the Far Eastern squadron was gone. Only the ancient Austria-protected cruiser *Kaiserin Elizabeth*, a German torpedo boat, and five German gunboats remained. (Only one gunboat, *Jaguar* was armed and mobile.)

The next day's patrol was armed. The Farman spotted *Kaiserin Elizabeth* and *Jaguar* providing gunnery support to the German troops defending Tsingtao. It attacked, the observer dropping small hand-held bombs on the cruiser. The bombs missed, but history had been made; a shipborne aircraft had attacked a warship.

While unsuccessful on 6 September, *Wakamiya*'s aircraft had better luck later, striking several communications and command centres on land and damaging a minelayer as the siege continued.

This plate shows a Farman taking off as *Wakamiya* lowers a second into the water, as the first air raid begins.





Europa was Italy's only seaplane carrier during World War I. *Europa* normally operated out of a harbour, rather than launching its aircraft at sea. This picture was probably taken at Valona, Albania. (AC)

of the great carrier strikes of World War II. Eight similar raids were attempted between March and July 1915, but were no more successful.

The pace of the seaplane carrier war accelerated in 1915. Joining the Royal Navy in early 1915 were *Campania*, an old Cunard liner converted to a seaplane carrier in late 1914, and *Ben-My-Chree*, an Isle of Man packet. A third packet would be converted in late 1915, seeing service as *Vindex*. *Ark Royal* was commissioned in December 1914, and dispatched to its first operational assignment on 10 January 1915. France also converted *Nord*, a paddlewheel Channel packet, to carry seaplanes. Commissioned in July 1915, it operated out of Dunkirk, its aircraft conducting anti-submarine patrols.

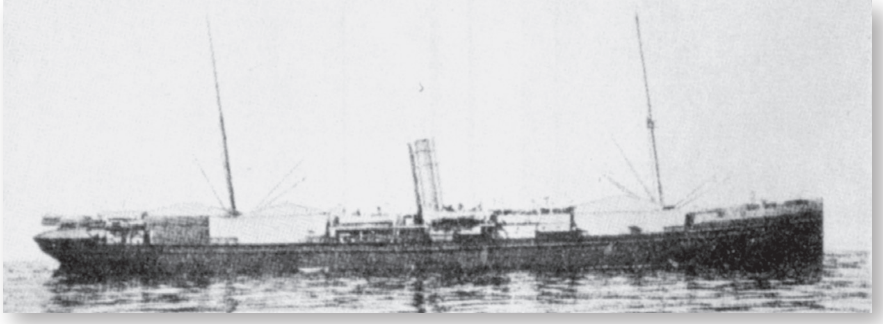
The handicap of *Ark Royal*'s slow speed had become obvious, so it was sent to the Mediterranean to support operations against the Ottomans, who had joined the Central Powers in November 1914. *Ark Royal*, along with France's *Foudre*, supported early operations in the Dardanelles starting in February 1915. *Ark Royal* operated out of Tenedos, a Greek island at the mouth of the Dardanelles and was joined by *Ben-My-Chree* in June 1915. During 1915, aircraft from *Ben-My-Chree* made several attacks against Turkish ships, including one aircraft that launched a torpedo which struck *Schram*, a large merchantman. It failed to sink the 5,000-ton *Schram*, because the ship was already on the bottom in shallow water, beached after previously being torpedoed by a British submarine.

In December 1914 and January 1915, Britain also converted two German-flagged cargo ships seized at Port Said at the war's onset to operate seaplanes. Hasty conversions, *Anne* and *Raven II* allowed Britain to operate seaplanes against Turkish targets off the Sinai and Syrian coasts until more suitable replacements could reach there. Both ships flew the Red Ensign while employed carrying seaplanes, operating with civilian crews. Both returned to merchant service in 1917–18.

Russia and Italy added seaplane carriers to their navies in 1915. In early 1915 Italy began work on *Europa*, which joined the *Regia Marina* in October. In May 1915, Italy declared war on Austria, but the narrow waters of the Adriatic allowed *Europa*'s aircraft, mostly Macchi flying boats, to operate from harbour. *Europa* was stationed at Brindisi throughout 1915.

Russia commissioned four seaplane carriers in early 1915, three in the Black Sea and one in the Baltic Sea. The Baltic Sea ship, *Orlitza*, spent most of its time in port, or on the inland lakes around Petrograd.

The Black Sea was a different story. By March 1915 Russia had three big, fast seaplane carriers in the Black Sea. It also had naval superiority. From March 1915 through to May 1915 these three ships launched airstrikes against the European coast of Turkey and off the Bosporus. In the last half of October, after Bulgaria declared war on Russia, similar strikes were launched against Varna, Bulgaria's biggest port. During these raids, the seaplane carriers were supported by Russian battleships, with the battleships protecting the carriers against Turkish naval intervention. This mirrored the pattern later used by World War II carrier strike forces.



France converted *Campinas*, originally a cargo liner, into a seaplane carrier by adding canvas hangars over the hatches. *Campinas* was converted at Port Said, and supported aviation operations in the Levant with aircraft transported to it by *Foudre*. (AC)

1916–17

As 1916 opened, Britain had nine seaplane carriers (including the quasi-civilian *Anne* and *Raven II*), Russia had four, Germany and France two each, and Italy, and Japan one each. Britain had four carriers in the Mediterranean and five in the North Sea. Russia had one in the Baltic and three in the Black Sea. France had one in the Mediterranean and one in the English Channel.

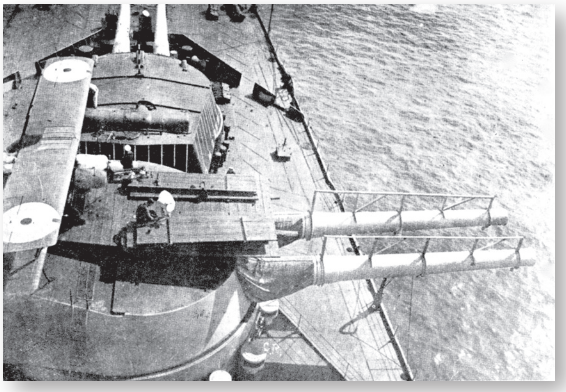
Carrier aviation matured during 1916 and 1917. New, more powerful aircraft were available by 1916 such as the Sopwith Pup fighter and Short Type 166, the first aircraft designed as a torpedo bomber. The lessons learned in 1915 improved both carrier operations and the carriers themselves. France, Russia, and especially Britain wanted more seaplane carriers, expanding their fleets in 1916 and 1917.

Carrier-based aircraft had failed to sink a single ship during the first 17 months of the war, however. Claims that the Japanese sank a torpedo boat at Tsingtao, that Britain sank cargo ships in the Levant or the Russians sank any ships in the Black Sea from carrier-based aircraft resulted from exaggeration or misinterpreted observations.

Seaplane carriers proved invaluable for aerial reconnaissance where landplanes could not reach. In the Dardanelles or the Ottoman coasts of Turkey, Syria and the Sinai Peninsular the only way to conduct aerial reconnaissance was from ship-based aircraft. In the North Sea carrier aircraft proved invaluable to drive off reconnaissance Zeppelins. Lacking sufficient scout cruisers, the German Navy increasingly relied on Zeppelins for scouting, over the course of the war.

Eliminating Zeppelins thus became a priority for Britain's forces in the North Sea. Britain again attempted to destroy Zeppelins in their bases during 1916, launching four more raids against Zeppelin sheds at Cuxhaven and Tondern between January and March 1916, but only one aeroplane, a Sopwith Baby, located its target, and its bomb missed.

Three of Russia's four seaplane carriers in the Black Sea. From right to left are *Ruminia*, *Imperator Nikolai I*, and *Imperator Alexandr I*. Missing is *Almaz*. This picture was taken in 1916, after Romania entered the war. (USNHHC)



By 1917, when the chance of a German High Seas Fleet sortie diminished, the Royal Navy installed aircraft launch platforms on turret tops. The platform's length can be increased by expanding the folded decking onto the framework on the guns. (AC)

Zeppelins frequently reached altitudes too high for seaplanes to reach. Only conventional aircraft, without the heavy floats required for seaplane operation, could climb high enough to reach them. In response the Royal Navy experimented with launching conventional aircraft from ships in 1915. It was early 1916 before mixed carriers, like *Campania* and *Vindex*, could reliably launch Sopwith Pups or naval versions of the Sopwith Camel and the Beardmore versions of the Camel as they became operational. Not until 2 August 1916 did a carrier-based aircraft, a Bristol Scout C, launched from *Vindex*, intercept a Zeppelin. It failed to destroy L-17, but did chase it off.

The first Zeppelin downed by a shipborne aeroplane was L-23, destroyed on 23 September 1917. Its attacker was a Sopwith Pup launched from the light cruiser HMS *Yarmouth*. By then, the Royal Navy was augmenting conventional aircraft available to the fleet by placing aircraft-launching ramps on battleships and cruisers, typically atop upper turrets.

Carrier-borne floatplanes continued to prove valuable for reconnaissance and attacking surface targets, more so in 1916 and 1917 than in previous years. Their value was demonstrated by an opportunity lost at the battle of Jutland. *Campania*, assigned to the main body of the Grand Fleet, failed to get orders to sail when the fleet sortied to intercept the High Seas Fleet. It later sailed independently in chase of the fleet, but was ordered back to port. *Engadine*, stationed with the Battle Cruiser Fleet, was present at Jutland. It launched a seaplane which found scouting German cruisers. Unfortunately, the report failed to get communicated promptly, and the British missed this opportunity to trap the High Seas Fleet.

More successful were British carrier operations in the Mediterranean and the Red Sea in 1916 and 1917. In addition to *Ben-My-Chree* (sent to Port Said in January 1917 after the withdrawal from Gallipoli), *Ark Royal* (stationed at Salonika after March 1916) and Red Ensign carriers *Anne* and *Raven II*, *Empress* was also sent to the Mediterranean in early 1916. *Ben-My-Chree*, *Anne*, *Raven II* and *Empress* operated as a squadron, occasionally joined by France's *Campinas*. In 1917 they were joined by *Manxman*.

British carriers launched raids along the Syrian coast and operated in the Red Sea. They disrupted supply lines, their aircraft attacking ports, bombing bridges and railroad lines, and disrupting signal stations. Once the Arab Revolt against the Ottoman Empire started in 1916 this force provided Arab irregulars with air support, conducting reconnaissance and making ground attacks along the Red Sea and Palestine coasts. They even entered the Indian Ocean briefly, searching for the German surface raider *Wolf* (an innocent-looking ex-freighter with hidden guns, which, incidentally, also carried a seaplane for reconnaissance).

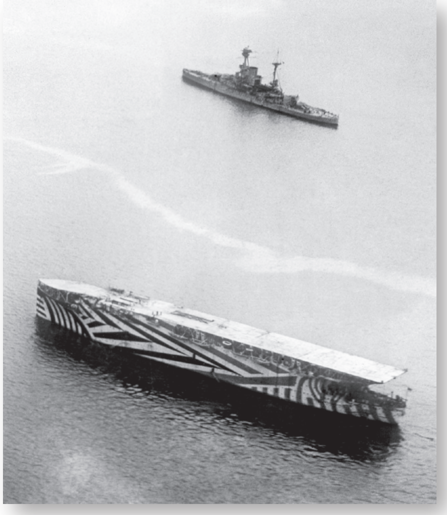
One sour note occurred in January 1917. *Ben-My-Chree* was ordered to a port within range of Turkish artillery on the Anatolian coast. It was shelled and sunk, the only seaplane carrier of any nation lost to enemy action.

Russia also continued using its Black Sea carriers aggressively during 1916 and 1917. Most notably *Almaz*, *Imperator Nicholai I*, and *Imperator Alexandr I* teamed up for a second raid on Varna in August 1916, repeating their tactics of the previous year. Aircraft launched from these ships also sank the Turkish collier *Irmingard* on 6 February 1916. At 4,211 gross registered tons (grt), it was the largest vessel sunk by carrier aircraft in World War I by any nation. Russia increased its seaplane carrier force in late 1916, when Romania became a co-belligerent and the big Romanian-flagged steamer *Ruminia* was added to the Russian fleet as a seaplane carrier.

The Revolution of March 1917 stopped Russian carrier activities for the rest of World War I. While Russia remained in the war through March 1918, internal turmoil kept the carriers in port until the war's end.

French, Italian, Japanese and German carrier operations remained at low levels throughout 1917. Except briefly during the Athens intervention in April 1917, *Foudre* was not used to operate seaplanes, instead serving as a submarine depot ship. The two French seaplane carriers in the Channel were withdrawn from aviation duties. Only *Campinas* continued as a seaplane carrier. Italy continued operating *Europa* from harbour, shifting from Brindisi to Valona, Albania. Japan re-rated *Wakamiya* as an aircraft depot ship, operating from the Yokasuka naval air station in that role for the rest of the war.

Germany was down to two seaplane carriers after *Glyndwr* struck a mine in 1915 and was never successfully repaired. The two remaining vessels confined their activities to the Baltic where, between September and October 1917, their seaplanes supported Operation *Albion*, an invasion of Russian-held islands in the Gulf of Riga. It was a rare example of Germany using its seaplane carriers offensively.



HMS *Argus* was the first flush-deck flight-deck aircraft carrier built. It entered service in 1918, and survived World War I and II. It is show here in 1918, in dazzle camouflage. An R-class battleship can be seen in the background. (IWM, Q 20618)

1918

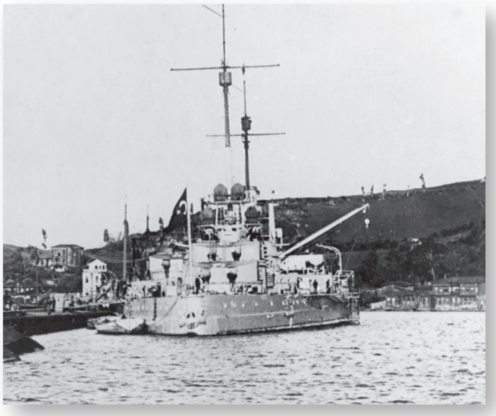
As World War I entered its final year, carrier operations grew. Despite the loss of *Ben-My-Chree* and the retirement of *Anne* and *Raven II*, the Royal Navy began 1918 with nine seaplane carriers. The three replacements were mixed carriers, more capable than the vessels replaced. The need for mixed carriers had been reduced because the Royal Navy started placing aircraft on dreadnoughts and cruisers in 1917.

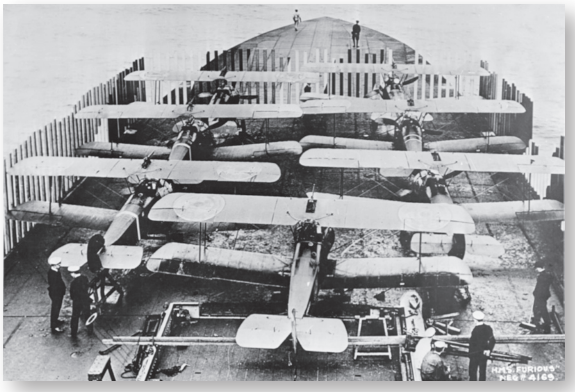
Additionally, HMS *Furious* was in the process of being converted from a mixed carrier and would rejoin the fleet as a true aircraft carrier in March. Four other aircraft carriers (*Argus*, *Vindictive*, *Hermes* and *Eagle*) were under construction, although only *Argus* and *Vindictive* were in commission by the war's end. (Work on *Hermes* and *Eagle* was suspended in mid-1918 – neither was completed until the 1920s.)

Britain was almost alone in expanding its aviation ship forces. Russia's navy was effectively out of the war. The US Navy removed all aircraft-handling equipment from its ships after the United States entered the war, allied with the Entente Powers. France was down to one seaplane carrier, the *Campinas*, with *Foudre* virtually retired. Italy had *Europa* and Japan *Wakamiya*, but neither nation was adding more ships.

Germany alone was adding seaplane carriers. In addition to converting another merchant vessel in early

The biggest threat to Allied ships in the Black and Aegean Seas was *Sultan Selim*, formerly the German battlecruiser *Goeben*. It survived many attempts by Allied naval aircraft to sink it. It is pictured in the Bosporus in 1918 or 1919. (USNHHC)





Seven Sopwith Camels are spotted on HMS *Furious*'s flying-off deck. The palisade is a windbreak, intended to protect the aircraft. This photo may have been taken prior to the Tondern raid, which used seven Camels. (USNHHC)

1918, it also converted a light cruiser, *Stuttgart*, to a seaplane carrier, finally gaining an aviation ship capable of steaming with the High Seas Fleet. But it arrived in May 1918, too late for any meaningful service. By then Russia was out of the war and Britain too strong at sea to challenge.

The build-up in carrier air power by the Royal Navy began to pay dividends. Britain now had enough mixed carriers to send their first generation of seaplane carriers to the Mediterranean. *Riviera* and *Engadine* began operating out of Malta, their aircraft helping to suppress U-boat activity in the central and western Mediterranean. *Empress* continued operating out of Port Said. They were joined by *Vindex* and *Nairana* as the year went on.

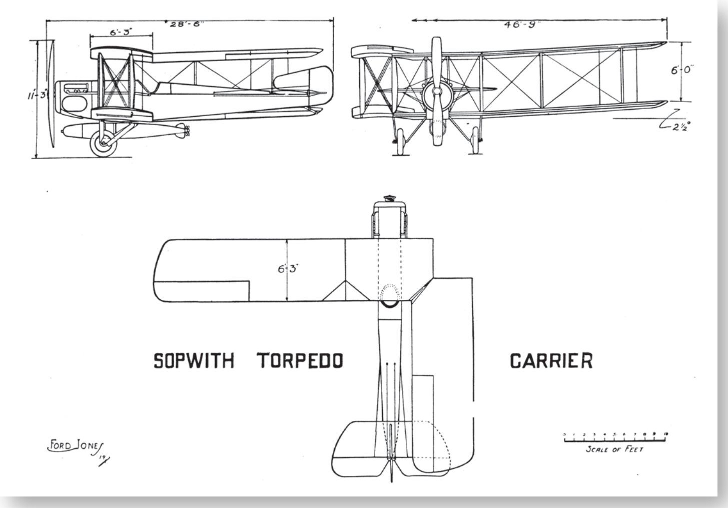
When *Sultan Selim* (the former German *Goeben*) sortied into the Aegean in January 1918, it struck a mine after sinking British monitors *Lord Raglan* and *M28*. Beached off Nagara Point to keep it from sinking, it was attacked, albeit unsuccessfully, by British aircraft including some flown off *Manxman*. The Ottomans patched up the battlecruiser, which spent the rest of the war in Constantinople.

Campania, *Pegasus* and *Furious* remained in the North Sea. *Furious* and *Pegasus* operated with the Battle Cruiser Fleet at Rosyth, while *Campania* was assigned to the main body, mooring at Cromarty Firth. Much of the anti-airship work done by the mixed carriers in 1916 and 1917 was shifted to surface warships equipped with flying-off platforms on the upper turrets.

This was a luxury afforded by Germany's increasing reluctance to risk their surface warships against the British Grand Fleet. The aircraft, aircraft fuel and platforms posed a fire risk, but only if the ship was shelled or bombed. The advantage was that patrolling aircraft discouraged submarine and Zeppelin attack. As long as the High Seas Fleet remained in port, the risk of carrying aircraft aboard battleships was outweighed by their advantages. If the High Seas Fleet sortied, everything flammable could be tossed overboard.

The arrival of *Furious* gave the air-minded Vice Admiral David Beatty (who replaced Admiral John Jellicoe as commander of the Grand Fleet) more opportunities to use aircraft offensively. In June 1918, *Furious* spearheaded two attacks on the German Zeppelin base at Tondern. Weather aborted those missions, but the third try worked. On 19 July six Sopwith Camels launched from *Furious* attacked the Zeppelin sheds at Tondern. (A seventh Camel aborted due to engine troubles.) All six found their target, flattening two sheds and destroying Zeppelins L-54 and L-60. Two Camels returned to *Furious*, three landed in Denmark and were interned, and

Other aircraft had been used as torpedo bombers, but the Sopwith Cuckoo was the first aircraft designed as a carrier-borne torpedo bomber. Capable of carrying a 1,000-pound torpedo and flying four hours, it had folding wings. (AC)



one disappeared, crashing unseen in the North Sea. While one shed was repaired, Tondern was abandoned as an operational base, remaining only as an emergency landing site.

The Royal Navy was planning an even bigger airstrike in 1918, against the High Seas Fleet. In 1917 the Royal Naval Air Service brought a new aeroplane into service, the Sopwith Cuckoo. The Cuckoo was designed as a torpedo bomber. Beatty conceived a plan to use this aircraft to destroy the High Seas Fleet at its anchorage in Wilhelmshaven. It required 120 Cuckoos plus 20 Camels for fighter escort. As envisioned eight carriers with 15 Cuckoos each were required. Starting at dawn three waves of 40 aircraft were to be launched with German battleships and battlecruisers to be targeted first.

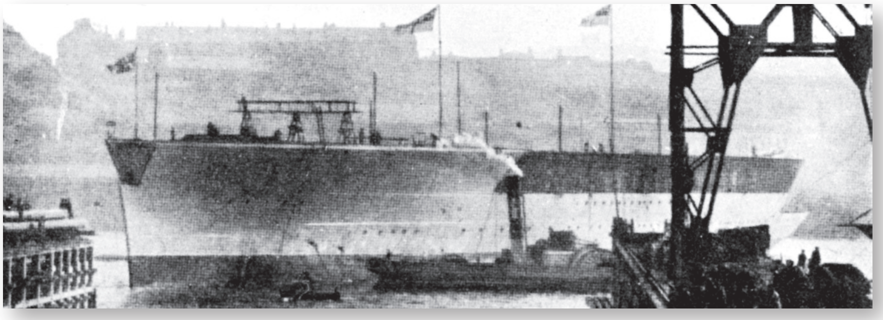
The plan was never executed. By October 1918 Britain had only three aircraft carriers in commission. These could be augmented with *Campania* and *Pegasus*, as well as aircraft launched from battleships and battlecruisers. *Glorious* and *Courageous*, viewed as too vulnerable to be used in the line of battle, were also candidates and could have carried six aircraft each. Even with additional Cuckoos launched from other battleships, the fleet likely could not have launched more than 80 aircraft. Another limitation was Cuckoo production. Only 90 had been delivered by Armistice Day on 11 November. Finally, such a strike would have sacrificed most of the aircraft as Cuckoos could land only on *Argus*, the landing decks of *Furious* and *Vindictive* being too small.

The raid remains a tantalizing what-if battle of World War I. Had the war extended to the spring of 1919 it might have been mounted. It might even have been risked in December 1918 or January 1919 on a smaller scale. Taking even a quarter of the German battle line out of action would have justified the aeroplanes lost. Yet the war ended on 11 November, too soon for its execution. Regardless, it shows that the Royal Navy, far from being reluctant to use aircraft, embraced their use. Beatty's plan was as bold and visionary for 1918 as Yamamoto's strike against Pearl Harbor was for 1941.

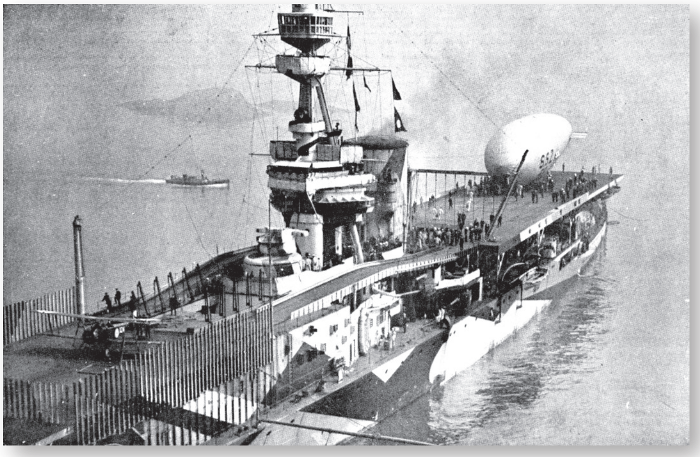
Afterwards

Ten months after the war ended, on 11 September 1919, HMS *Hermes* was launched. The name recycled one used for Britain's first aviation ship, the light cruiser/seaplane carrier of 1913–14, sunk in the war's opening days. This *Hermes* was as groundbreaking as the earlier one. Started in the closing year of World War I, it was the first warship designed and built from the keel up as an aircraft carrier. However, it would not be commissioned for another four years.

Hermes was soon joined by other aircraft carriers. By 1933 Britain and three other nations had built a total of 12 more aircraft carriers and *Furious*



Construction started on HMS *Hermes* in January 1918, but was suspended in mid-1918. *Hermes* was launched in 1919 to clear the building slip, but not completed until 1923. (AC)



HMS *Furious* at the end of World War I. Only three of 13 attempted deck landings on *Furious* proved successful. The landing deck was subsequently used for experiments in landing balloons on ships, as shown in this picture. (AC)

had been modified to a flush-deck carrier. Along with Japan's *Hosho*, *Hermes* had the distinction of being the only aircraft carrier built from the keel up as an aircraft carrier until 1933, when Japan commissioned *Ryujo*. All others were converted to aircraft carriers while building, typically on battleship or battlecruiser hulls. Within another decade the keel-up ships outnumbered the conversions, and by the end of World War II more aircraft carriers had been built than dreadnoughts through the end of World War I.

After World War I's end, of the seaplane carriers converted from merchant hulls Britain retained *Pegasus* and Japan retained *Wakamiya*. The rest returned to civilian service. Some were scrapped in the years between the two world wars, and some were sunk during World War II. A few re-entered naval service during World War II, but none as aviation ships. Any of the former World War I seaplane carriers which survived World War II were scrapped in the post-war years.

Of the naval warships used as seaplane carriers, *Foudre* and *Almaz* were broken up in the 1920s and 1930s, respectively. Great Britain had eight warships from World War I associated with naval aviation which saw service during World War II. Four – *Ark Royal*, *Furious*, *Vindictive* and *Argus* – had been commissioned as seaplane carriers or aircraft carriers before Armistice Day. Four – *Hermes*, *Eagle*, *Courageous* and *Glorious* – were first commissioned as aircraft carriers after World War I ended. The first four survived World War II (*Ark Royal* had been renamed *Pegasus* in 1934). The other four were sunk during the war. Ironically, only *Hermes* would be sunk by a carrier airstrike. Submarines and surface action accounted for the others.

D

EVOLUTION OF HMS *FURIOUS*

Furious was originally intended as a 'large light cruiser' to support a planned Pomeranian invasion. Its main battery was 18in guns in two single turrets. After the plan was cancelled, construction continued.

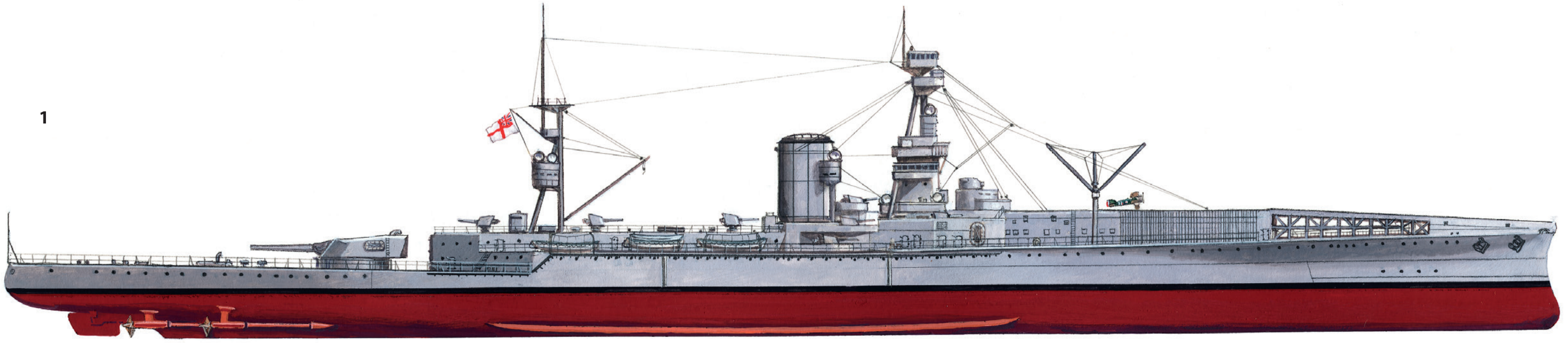
By 1917, shortcomings of Britain's existing carrier force had become obvious. Merchant conversions were too small and too slow for fleet needs. *Furious*, nearing completion and of questionable value as a surface warship, was converted to a seaplane carrier.

When commissioned in June 1917, *Furious* appeared as it does in profile **1**. The aft 18in gun turret was retained, the forward turret removed, and it was replaced with an aircraft hangar. A large, downward-sloping flying-off deck was added, modelled on that of *Campania*'s. *Furious* emerged as a mixed carrier, similar to others then in the Royal Navy.

Operational trials during 1917 revealed a need for a landing deck. Firing its 18in gun also damaged the ship's structure. In November 1917 *Furious* started a rebuild to change it into an aircraft carrier. The turret was removed and replaced with a landing deck and hangar. Gangways along the ship's side linked the two flight decks. It returned to the fleet in March 1918, appearing as it does in profile **2**.

In 1922, *Furious* was altered to a flush-deck aircraft carrier with a continuous flight deck. It was built without an island. A secondary flying-off was added on the hangar deck, to allow two aircraft to launch simultaneously. When recommissioned in 1925, its appearance matched profile **3**.

1



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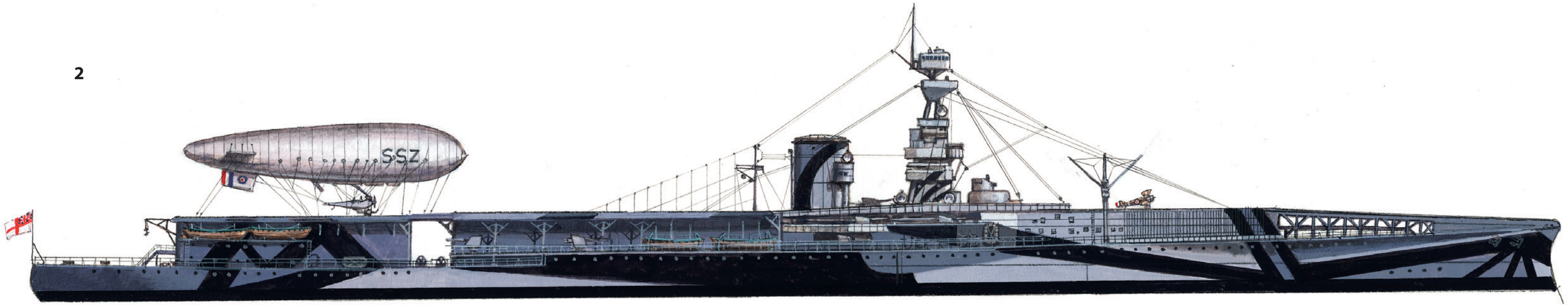

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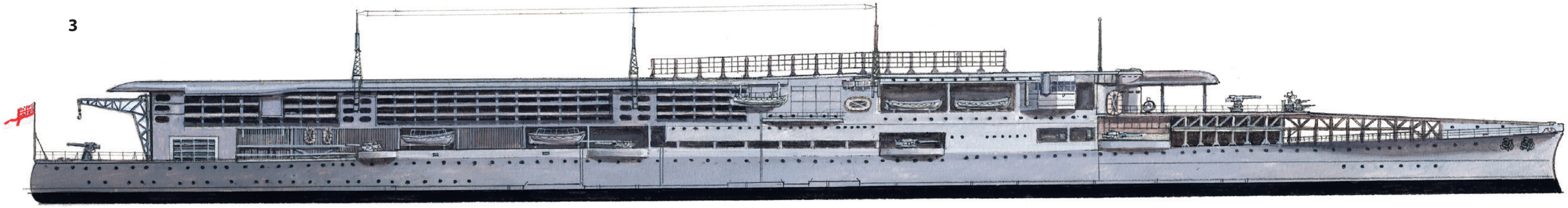


THE SHIPS

All measurements are imperial: feet, tons, knots and horsepower. Length is length overall. Draft is average draft. Displacement is long tons (2,240 pounds). When values are unknown, the entry is marked '?'. Initial armament and maximum aircraft are given, but armament and aircraft changed frequently during the operational lifetime of vessels. Because of this, varying reports exist, and often all are correct. I have relied on R. D. Layman for most statistics, as he has carried out the most research in this field.

Great Britain

Seaplane Carriers

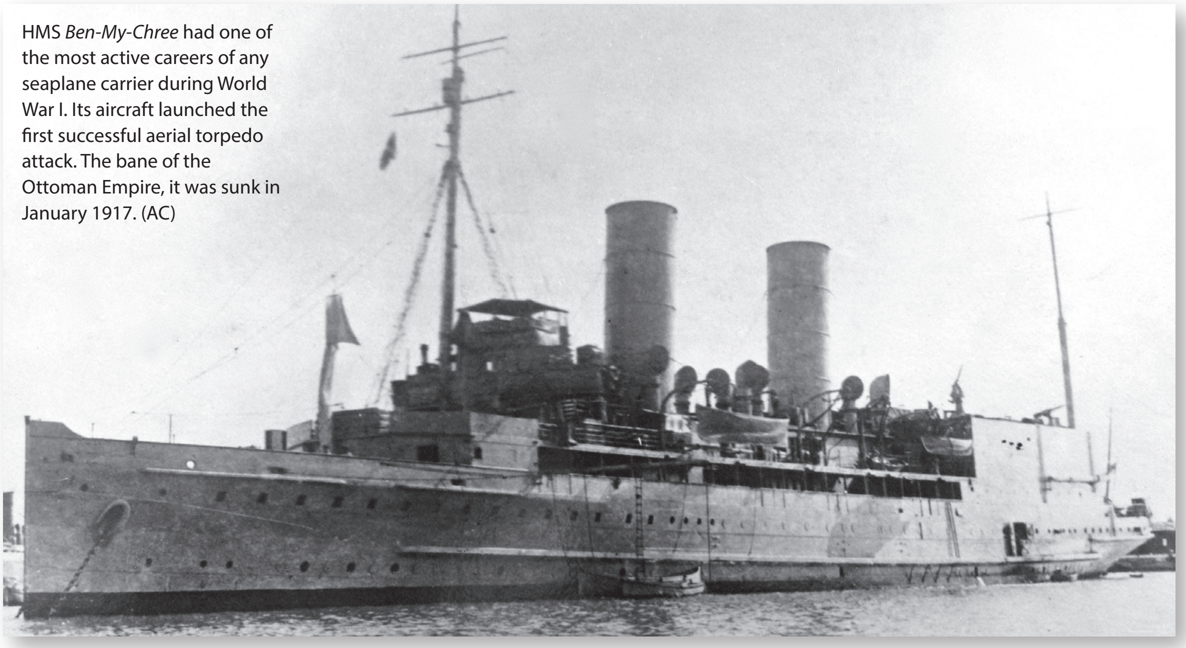
This list includes only vessels with permanent structure added to accommodate aircraft. Britain operated aircraft on several vessels temporarily, including two seized German freighters, *Anna* and *Raven II*, temporarily converted by adding canvas hangars over the holds and two paddle steamers, *Brocklesby* and *Killingholme*, which operated seaplanes briefly in 1916–17. *Slinger*, a catapult trials ship, is excluded from the list because it was used experimentally, not operationally.

Riviera	
Displacement	2,250 tons
Dimensions	316ft × 41ft × 13ft 8in
Machinery	three direct-drive turbines (three shafts), six boilers, 11,000shp
Fuel	Coal
Max Speed	20.5kts
Armament	four 12-pdr, two 3-pdr
Aircraft	Four
Launched	1 April 1911
Completed	1911
Converted	September 1914

The first of three South Eastern and Chatham Railway Company (SE&CRC) cross-Channel packets requisitioned and purchased by the Admiralty in August 1914, it was converted to a seaplane tender by adding canvas shelters fore and aft. Initially assigned to Harwich force it participated in the Cuxhaven raid. In early 1915, a permanent hangar was added aft. *Riviera* served on the English Channel from mid-1915 to early 1918. It was transferred to the Mediterranean for the rest of the war. Returned to its owner after the war, it was requisitioned by the Royal Navy in 1939, serving in auxiliary roles. Returned to its owner again in 1945, it was scrapped in 1957.

Engadine	
Displacement	2,250 tons
Dimensions	316ft x 41ft x 13ft 8in
Machinery	three direct-drive turbines (three shafts), six boilers, 13,000shp
Fuel	Coal
Max Speed	21.5kts
Armament	four 12-pdr, two 3-pdr
Aircraft	Four
Launched	23 September 1911
Completed	1912
Converted	September 1914

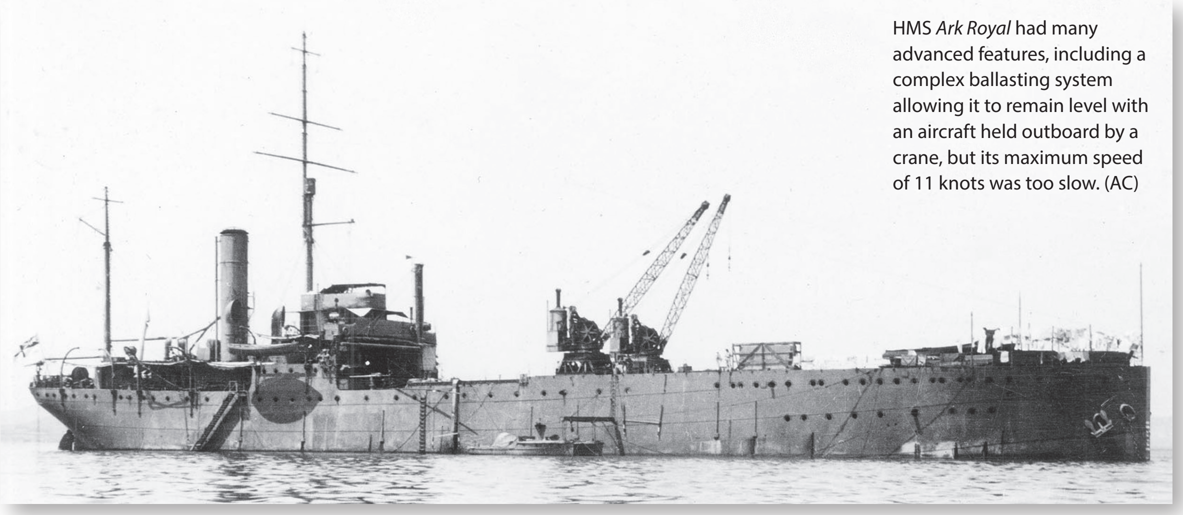
A close sister to *Riviera*, *Engadine* was another SE&CRC packet requisitioned by the Admiralty, experiencing conversions similar to *Riviera*. Participating in the Cuxhaven raid, it was attached to the Battle Cruiser Fleet in October 1915. It participated in the battle of Jutland, launching one Short 184 during the battle. In 1918 it was transferred to the Mediterranean. Returned to its owners in 1919, it was sold to a Philippines shipping company in 1933, and renamed *Corregidor*. It sank in December 1941, after striking a mine in Manila Bay.



HMS *Ben-My-Chree* had one of the most active careers of any seaplane carrier during World War I. Its aircraft launched the first successful aerial torpedo attack. The bane of the Ottoman Empire, it was sunk in January 1917. (AC)

Empress	
Displacement	1,721 tons
Dimensions	323ft x 41ft x 15ft
Machinery	three direct-drive turbines (three shafts), six boilers, 11,000shp
Fuel	Coal
Max Speed	18kts
Armament	four 12-pdr, two 3-pdr
Aircraft	Four
Launched	13 April 1907
Completed	1907
Converted	September 1914
The third SE&CRC packet requisitioned by the Admiralty, *Empress* had the same conversions as *Riviera* and *Engadine*. It participated in the Cuxhaven raid and served in the Mediterranean from January 1916 through the war's end, primarily in the Eastern Mediterranean. Returned to its owners in 1919, it was subsequently sold several times and scrapped in 1933.	

Ben-My-Chree	
Displacement	3,888 tons
Dimensions	387ft x 47ft x 15ft
Machinery	three direct-drive turbines (three shafts), four boilers, 14,500shp
Fuel	Coal
Max Speed	24.5kts
Armament	four 12-pdr, two 3-pdr
Aircraft	four to six
Launched	23 April 1908
Completed	8 August 1908
Converted	23 March 1915
A popular Manx ferry before the war, *Ben-My-Chree* ('Woman of my Heart' in Manx) was purchased by the Royal Navy in January 1915 for conversion to a seaplane tender. It replaced *Ark Royal* in the Dardanelles in June 1915. Serving as flagship for the East Indies and Egypt Seaplane Squadron, its aircraft launched the first successful aerial torpedo attack. It was sunk in Kastellorizo Harbour by Turkish artillery in January 1917, the only aviation vessel lost to enemy action in World War I. The wreck was raised in 1921 and scrapped.	



HMS *Ark Royal* had many advanced features, including a complex ballasting system allowing it to remain level with an aircraft held outboard by a crane, but its maximum speed of 11 knots was too slow. (AC)

Ark Royal	
Displacement	7,450 tons
Dimensions	366ft x 50ft x 18ft
Machinery	one triple expansion (one shaft), three boilers, 3,000shp
Fuel	Oil
Max Speed	11kts
Armament	four 12-pdr, two machine guns (MG)
Aircraft	Eight
Launched	9 September 1914
Completed	10 December 1914
Commissioned	10 December 1914

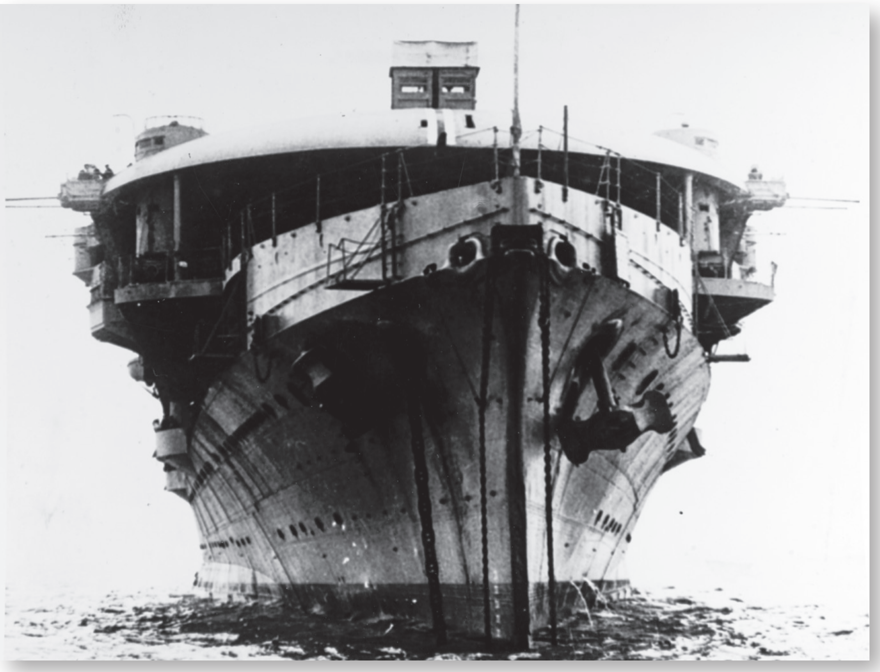
The first vessel designed and built to carry aircraft, *Ark Royal*'s slow speed crippled its usefulness. It was unable to steam with the fleet. Sent to the Dardanelles in February 1915, it supported the Gallipoli campaign until relieved by *Ben-My-Chree*. It served as a seaplane depot ship in the Aegean through November 1918 and in the Black Sea through 1923. In 1930, equipped with a catapult, it conducted seaplane trials and training. In 1935 it was renamed *Pegasus*. It served as an aircraft transport and Catapult Fighter Ship through World War II. Sold in 1946, it was scrapped in 1950.

Campania	
Displacement	20,570 tons
Dimensions	622ft x 65ft x 28ft 5in
Machinery	two triple expansion (two shafts), thirteen boilers, 21,000shp (estimated, 1918)
Fuel	Coal
Max Speed	23.2kts (18kts in 1918)
Armament	six 4.7in quick fire (QF), one 3in anti-aircraft (AA)
Aircraft	Twelve
Launched	8 September 1892
Completed	13 April 1893
Commissioned	17 April 1916

Built as an ocean liner, *Campania* won the Blue Riband in 1893 and 1894, but awaited scrapping in 1914. Purchased for conversion to an auxiliary cruiser, *Campania* was converted to a seaplane carrier instead, with a forward hangar and a launching platform. It made its first operational cruise with the Grand Fleet in 1915. Operational shortcoming led to a further modification lengthening the launching platform by splitting the forward funnel. Returning to the Grand Fleet in April 1916, *Campania* missed the battle of Jutland, but served with the Grand Fleet until 1918. On 5 November, *Campania* dragged her anchors in a gale, struck two ships, and sank.

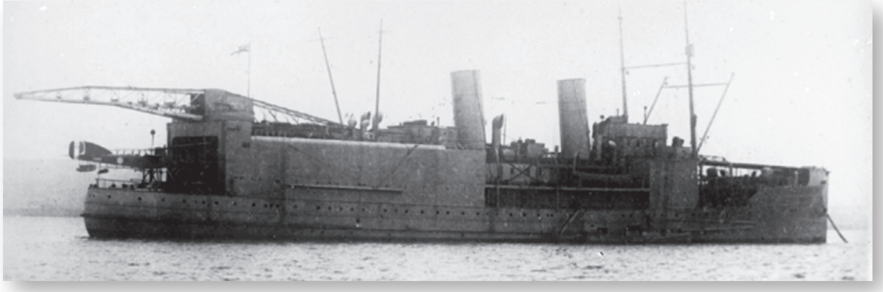
Vindex	
Displacement	2,950 tons
Dimensions	361ft x 42ft x 13ft 3in
Machinery	three direct-drive turbines (three shafts), four boilers, 11,000shp
Fuel	Coal
Max Speed	23kts
Armament	four 12-pdr, one 6-pdr AA
Aircraft	Seven
Launched	7 March 1905
Completed	26 June 1905
Commissioned	11 October 1915
The Isle of Man packet *Viking* was requisitioned by the Royal Navy in April 1915, renamed *Vindex*, and converted to a mixed carrier, with a hangar for seaplane carriers aft and a launching platform for wheeled aircraft forward. Attached to the Harwich Patrol in November 1915, it served on anti-airship patrols until 1917. Transferred to the Mediterranean in 1918, it served there until returned to its owner in 1920. It was requisitioned as a troopship in World War II, returned to its owner in 1945, and sold for scrapping in 1954.	

Manxman	
Displacement	3,090 tons
Dimensions	334ft x 43ft x 14ft 3in
Machinery	three direct-drive turbines (three shafts), three boilers, 6,300shp
Fuel	Coal
Max Speed	18kts
Armament	four 12-pdr, two 6-pdr AA
Aircraft	Eight
Launched	15 June 1904
Completed	1904
Commissioned	December 1916
Another Manx packet, *Manxman*, was purchased in April 1916 and converted to a mixed carrier, joining the Battle Cruiser Fleet in December. It served there through September 1917 before being transferred to the Mediterranean in October. It remained until the war's end, mainly around Italy. Sold to the Isle of Man Steam Packet Company in 1920, *Manxman* was requisitioned by the Admiralty in 1941, converted to a radar-training ship, and renamed *Caduceus*. It was scrapped in 1949.	



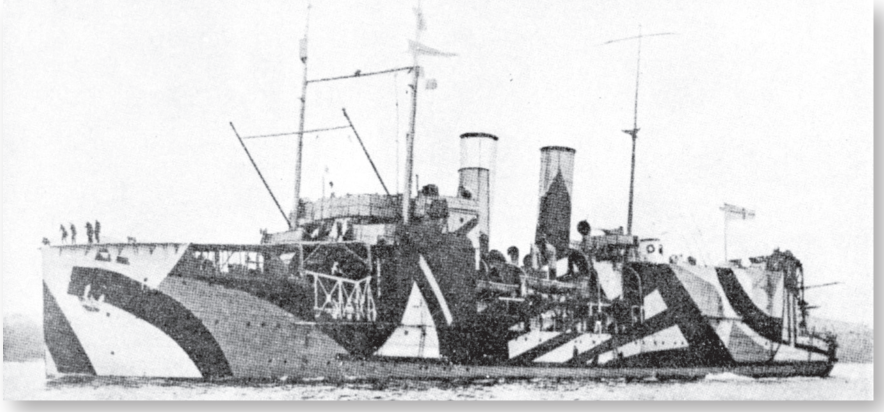
HMS *Furious* was rebuilt as a flight-deck carrier between 1922 and 1925. It had a retractable bridge which could be lowered flush with the flight deck. This picture shows *Furious* in 1926. Its bridge is raised in this picture. (USNHHC)

HMS *Nairana* was one of five mixed carriers commissioned by the Royal Navy in World War I. Intended as a high-speed passenger ferry it was converted when nearly completed. A Short 184 can be seen in the stern hangar. (AC)

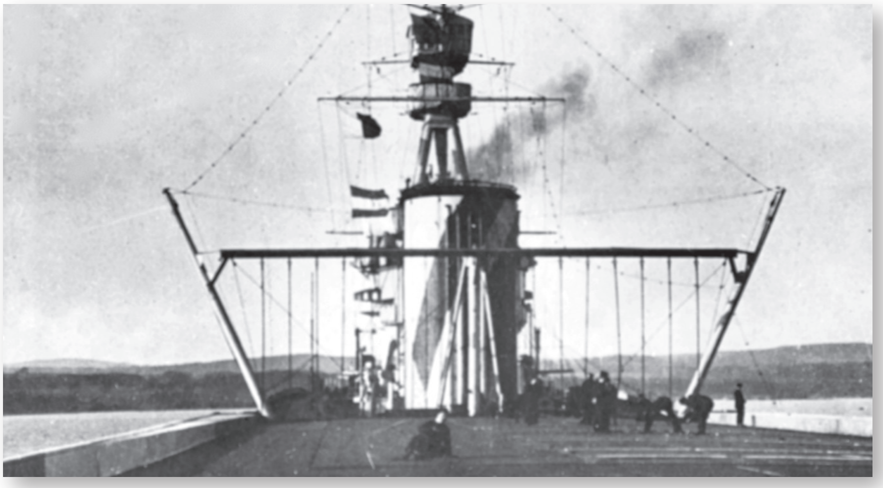


Nairana	
Displacement	3,070 tons
Dimensions	352ft x 45ft 6in x 13ft 2in
Machinery	two geared turbines (two shafts), six boilers, 6,700shp
Fuel	Coal
Max Speed	20.3kts
Armament	two 12-pdr low angle (LA), two 12-pdr AA
Aircraft	Eight
Launched	21 June 1915
Completed	25 August 1917
Commissioned	25 August 1917
Purchased while under construction *Nairana* was completed as a mixed carrier. It initially served with the Battle Cruiser Fleet as a pilot training ship and aircraft ferry until transferred to the Mediterranean in 1918. It supported the British intervention in Archangel in 1919. Returned to civilian service in 1920, it ran aground at Port Melbourne, Australia in 1951. It was scrapped as a constructive loss.	

Pegasus	
Displacement	3,300 tons
Dimensions	332ft x 43ft x 15ft 4in
Machinery	two geared turbines (two shafts),? boilers, 9,700shp
Fuel	Oil
Max Speed	20.25kts
Armament	two 12-pdr LA, one 12-pdr AA
Aircraft	Nine
Launched	9 June 1917
Completed	8 August 1917
Commissioned	8 August 1917
Purchased while under construction, and converted to a mixed carrier, *Pegasus* joined the Battle Cruiser Fleet at Rosyth upon commissioning. It served there to the end of the war, primarily conducting pilot training and aircraft ferrying. It served at Archangel in 1919 and at the Dardanelles in 1920. Retained by the Royal Navy, it was re-rated as an aircraft tender in 1924, placed in reserve in 1925, and scrapped in 1931.	



HMS *Pegasus* was the final mixed carrier commissioned for the Royal Navy. The only mixed carrier purchased on the building ways, and significantly altered internally, it was the only mixed carrier retained by the Royal Navy after World War I ended. (AC)



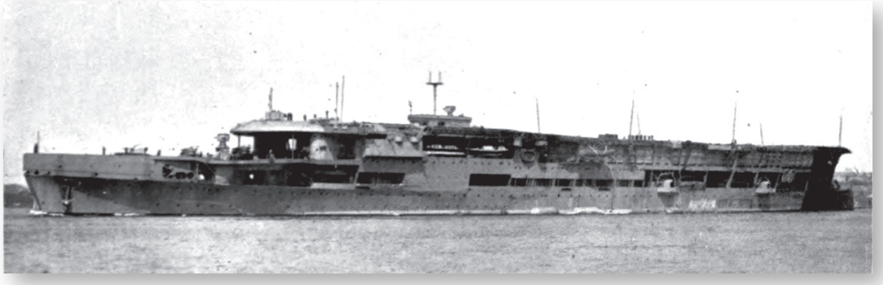
The shortcomings of *Furious*'s 1918 landing deck are shown by this picture of *Furious*. Funnel fumes and wind turbulence from the superstructure subjected an aircraft to unpredictable air currents. An overshooting aircraft ended up in the barrier. (USNHHC)

Aircraft Carriers

This list contains vessels operational as aircraft carriers prior to the end of World War I. It excludes the aircraft carrier *Hermes*, laid down in January 1918 but not launched until September 1919, and *Eagle*, started as a battleship in 1913, but completed as an aircraft carrier in 1924.

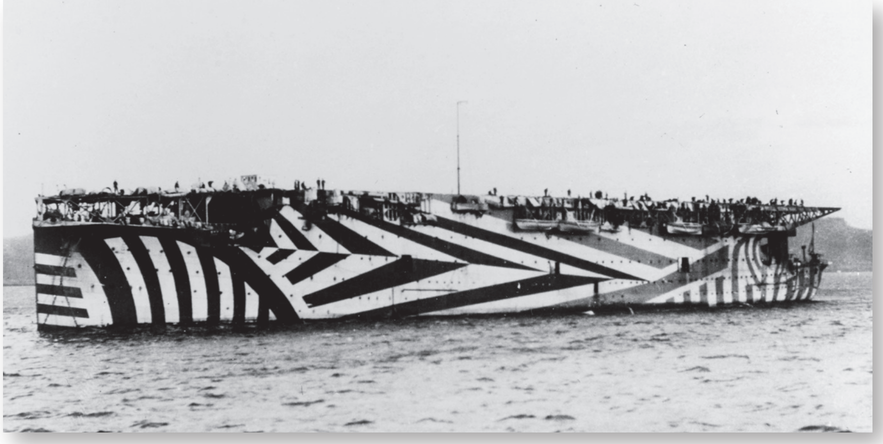
Furious	
Displacement	19,100 tons
Dimensions	786ft 3in x 88ft x 21ft 6in
Machinery	two geared turbines (four shafts), 18 boilers, 90,000shp
Fuel	Oil
Max Speed	31.5kts
Armament	As completed: one 18in, 11 5.5in LA, two 3in AA, four 3-pdr, 18 21in torpedo tubes. After March 1918: ten 5.5in LA, five 3in AA, four 3-pdr, five MG, 12 21in torpedo tubes
Armour	belt – 2–3in; deck – 1–3in; barbette – 3–7in; turret – 5–9in; conning tower – 10in
Aircraft	As completed: ten. After March 1919: 16
Launched	18 August 1916
Completed	26 June 1917
Commissioned	26 June 1917

Intended as a 'large light cruiser' with an 18in battery, *Furious* was converted to a fast seaplane carrier while building, by removing the forward turret and replacing it with a flying-off deck and aircraft hangar. It joined the Grand Fleet in that configuration on 4 July 1917, with five Sopwith Pups and three seaplanes. The first deck landing was done in this configuration with a Pup side-slipping onto the flying-off deck. The pilot was killed on the second try. In November, *Furious* was again converted, removing the aft turret and mainmast and adding a landing deck and hangar aft. Recommissioned in March 1918, *Furious* took part in fleet operations through the war's end, but landing remained problematic. Converted to a flight-deck carrier in 1924, it served through the inter-war years. By World War II it was worn out, and used as a training vessel until 1944, when it was placed in reserve. It was scrapped in 1948, having survived all other World War I ships used as aircraft carriers.



HMS *Furious* was rebuilt as a flight-deck carrier between 1922 and 1925. It had a retractable bridge which could be lowered flush with the flight deck. This picture shows *Furious* in 1941, during World War II. (AC)

Argus	
Displacement	15,775 tons
Dimensions	565ft x 68ft x 21ft
Machinery	two geared turbines (four shafts), 12 boilers, 21,376shp
Fuel	Oil
Max Speed	20.5kts
Armament	two 4in LA, four 4in AA
Aircraft	21
Launched	2 December 1917
Completed	14 September 1918
Commissioned	14 September 1918
Laid down as a cargo liner in 1914, the hull was purchased by the Admiralty for conversion to an aircraft carrier in 1916. It was completed as a flight-deck carrier in 1918, with a light flight deck built over the hangar deck. It proved the prototype design for all subsequent aircraft carriers. *Argus* joined the Grand Fleet in October 1918, carrying a squadron of Sopwith Cuckoos intended for a strike on the German fleet in Wilhelmshaven. The war ended before the strike took place. *Argus* was used during the Russian intervention in 1919, carrying aircraft to Archangel. *Argus* served as a fleet carrier in the 1920s. Recommissioned in 1938 as a training carrier, it continued in that role and as an aircraft transport until October 1944. Placed in reserve, it was scrapped in 1946.	



HMS *Argus* in its 1918 dazzle camouflage. Until *Hermes* was commissioned in 1923 *Argus* was the sole effective aircraft carrier in the Royal Navy. It proved invaluable in aircraft carrier trials during that period, helping to perfect carrier operations. (USNHHC)

E

LOSS OF HMS *BEN-MY-CHREE*

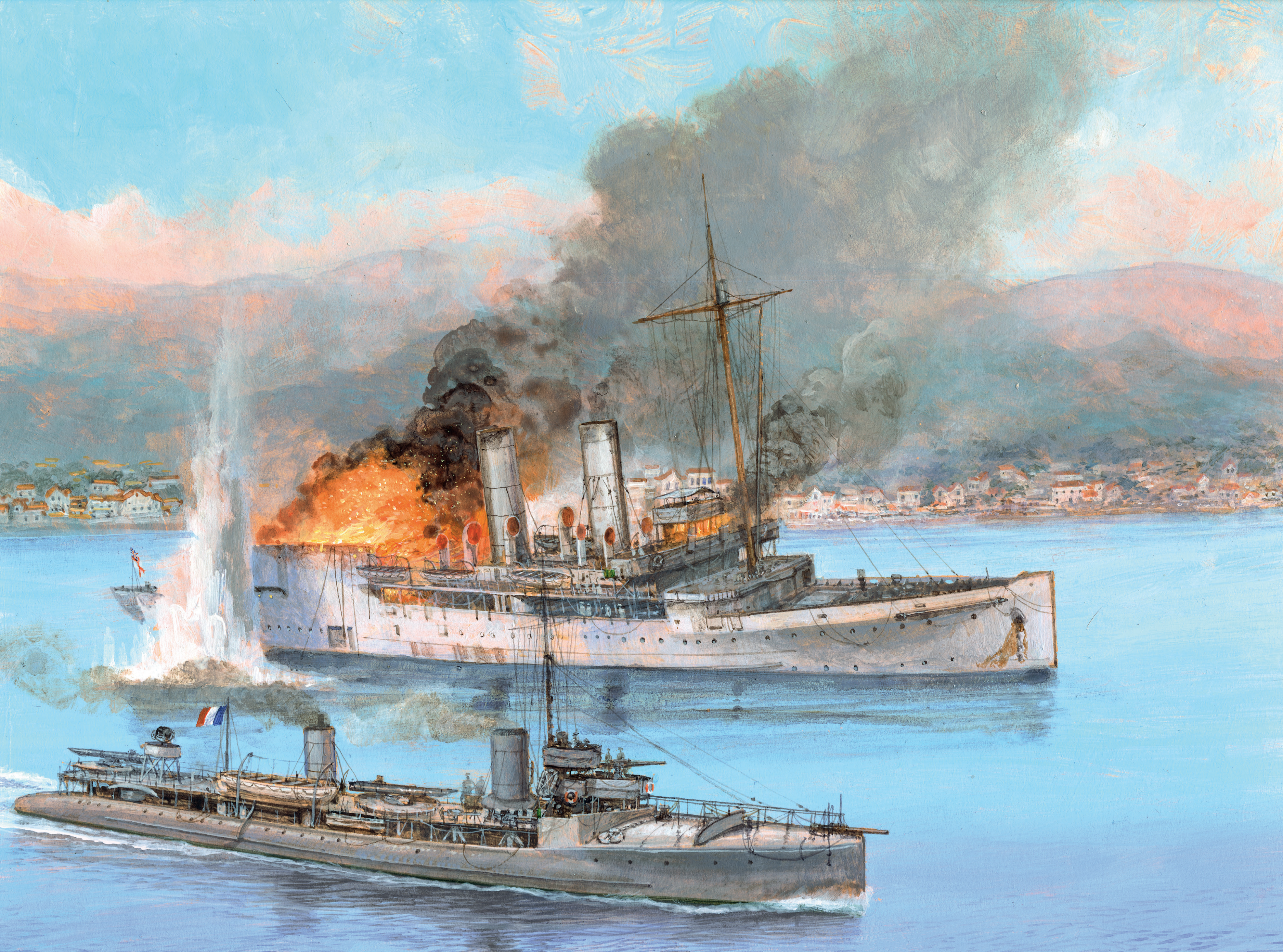
From June 1915 through to January 1917 *Ben-My-Chree* (Woman of my Heart in Manx Gaelic) ranged the coasts of the Ottoman Empire from Gallipoli to the Red Sea. Its aircraft launched the first successful aerial torpedo attack and conducted raids off Bulgaria, Turkey, Syria and the Arabian Peninsula. Perhaps it was inevitable that it would be the first (and only) aviation ship lost to enemy action during World War I.

It was being used as a fast supply ship when lost. Following a refit at Suez during December 1916, *Ben-My-Chree* was ordered to the island of Kastellorizo. The island lay a few miles off the southern coast of Turkey. In late 1916, its Greek inhabitants rose against their Ottoman overlords, seeking Allied assistance. Responding, the French landed troops on the island and were using it as a base to raid Turkey. By early January they needed resupply.

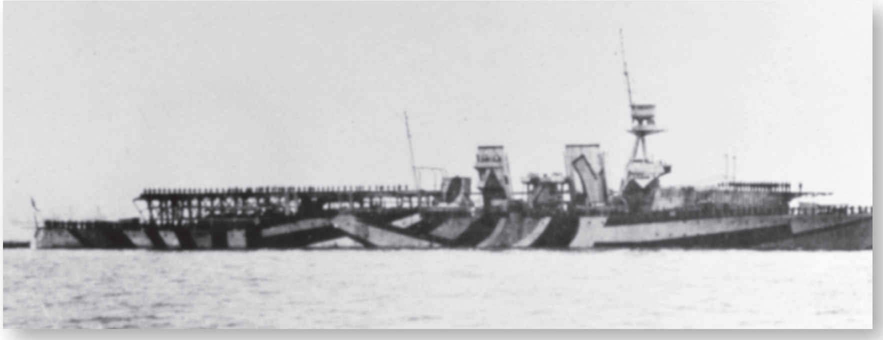
Escorted by the French destroyer *Ariadne*, *Ben-My-Chree* arrived at Kastellorizo on the morning of 9 January 1917. The harbour, on the north side of the island was U-shaped and faced the Turkish shore, only four miles away. *Ben-My-Chree*'s captain was reluctant to enter the harbour, but obeyed orders to dock there, plainly visible on the Turkish mainland.

It was both an easy and inviting target for the Turkish 105mm artillery battery stationed in the mountains above the harbour town of Antifilo (today's Kas). While *Ben-My-Chree*'s crew unloaded supplies unmolested throughout the morning, at 2.10pm the Turkish guns opened fire.

The stationary *Ben-My-Chree* was soon bracketed. A salvo struck the hangar, causing a fire. Soon, *Ben-My-Chree* was ablaze, with more Turkish shells hitting it. At 2.45pm, its captain, Commander Charles Sampson ordered *Ben-My-Chree* abandoned. By evening, charred and battered, *Ben-My-Chree* settled on the bottom, its superstructure still above water.



HMS *Vindictive* never lived up to expectations, inheriting the flaws of *Furious*'s 1918 configuration exacerbated by *Vindictive*'s smaller size. It was converted back to a cruiser in 1922–25. It is shown here in its 1918 dazzle camouflage. (USNHHC)

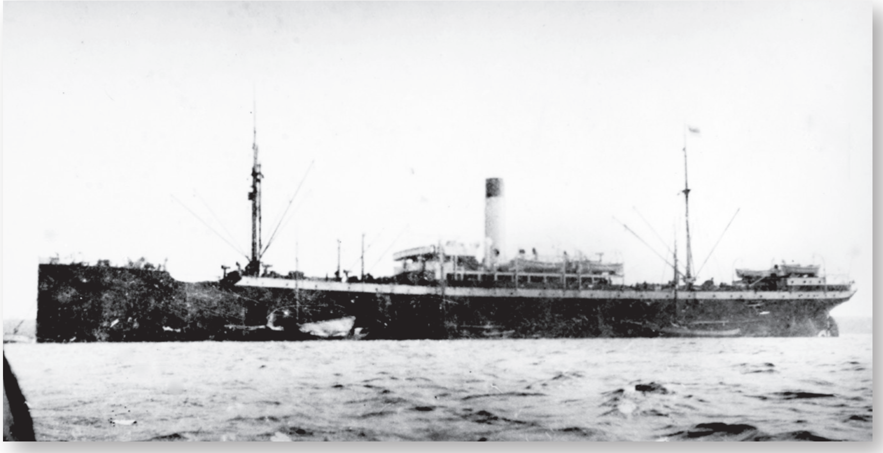


Vindictive	
Displacement	9,344 tons
Dimensions	605ft x 65ft 2in x 17ft 6in
Machinery	four geared turbines (four shafts), 12 boilers, 60,000shp
Fuel	Coal and oil
Max Speed	29.75kts
Armament	four 7.5in LA, four 3in LA, four 3in AA, four MG, six 21in torpedo tubes.
Armour	belt – 1.5–3in; deck – 1–1.5in; gun shields – 1in; conning tower – 3in
Aircraft	12
Launched	17 January 1918
Completed	21 September 1918
Commissioned	21 September 1918
Intended as a second fast carrier for the Grand Fleet, *Vindictive* was modified during building from a Cavendish, a Hawkins-class cruiser, into a miniature *Furious* with a flying-off deck forward and landing deck aft. Commissioned just before the war's end, *Vindictive* saw combat during the 1919 Russian intervention in Baltic operations. The deck arrangement proved impractical (only one landing was attempted), and the ship performed poorly in the Baltic. Believed too small for conversion to a flight-deck carrier, *Vindictive* was converted back to a cruiser in 1923, with aviation structures removed. In 1937 *Vindictive* was demilitarized under the London Naval Treaty, converted to a training ship and then in 1940 a repair ship. Laid up in 1945, it was scrapped in 1946.	

Germany

German seaplane carriers were all merchant conversions, with the exception of SMS *Stuttgart*. In addition conversion of SMS *Roon* was begun, but later abandoned. Only ships completed during World War I with permanent modifications are included in this list.

Answald	
Displacement	13,200 tons
Dimensions	440ft x 54ft 6in x 24ft
Machinery	two compound steam engines (one shaft), three boilers, 2,100shp
Fuel	Coal
Max Speed	11kts
Armament	two 8.8cm AA
Aircraft	six
Launched	September 1909
Completed	1910
Converted	7 July 1915
A cargo-passenger vessel leased on 3 August 1914 for conversion to a seaplane carrier and torpedo depot ship, it had canvas hangars added amidships and aft. Due to conversion problems, it was not commissioned until July 1915. Slow speed limited its service to the Baltic, at Libau and Swindmuende. Surrendered to Britain in 1919, it returned to merchant service as *Vulcan City*, and was scrapped in 1933.	

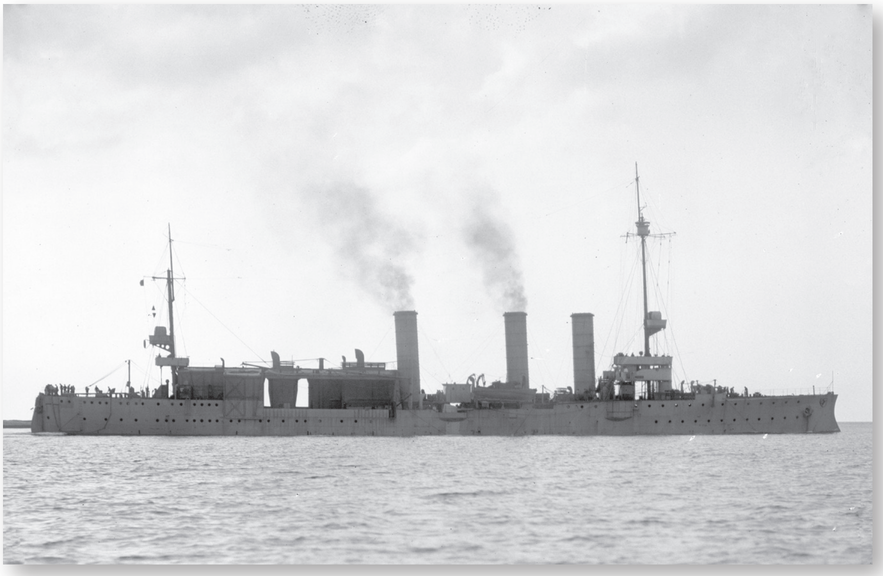


Santa Elena was one of two cargo liners chosen for conversion to seaplane carriers by Germany in August 1914. *Santa Elena* is pictured after the end of World War I, after the United States Navy took it over. (USNHHC)

Santa Elena	
Displacement	13,900 tons
Dimensions	452ft x 55ft x 23ft
Machinery	one quadruple-expansion steam engine (one shaft), three boilers, 2,800shp
Fuel	Coal
Max Speed	11kts
Armament	two 8.8cm AA
Aircraft	four
Launched	16 November 1907
Completed	1908
Converted	2 July 1915
Another cargo-passenger liner leased on 3 August 1914 and converted like *Answald*. Commissioned in July 1915, it served in the Baltic through to February 1918, participating in the seizure of islands in the Gulf of Riga. Transferred to the North Sea, it operated out of Wilhelmshaven through to November 1918. Surrendered to the United States in September 1919, it transferred to merchant service, serving under British, French, and Italian registry respectively. Seized by Germany in 1943, it sank at Marseilles in August 1944, and was raised and scrapped in 1945.	

Glyndwr	
Displacement	6,000 tons
Dimensions	331ft x 44ft x 19ft
Machinery	one triple-expansion steam engine (one shaft), two boilers, 1,200shp
Fuel	Coal
Max Speed	10kts
Armament	two 10.5cm
Aircraft	four
Launched	October 1904
Completed	1905
Converted	December 1914 to January 1915
The British-flagged *Glyndwr*, interned at Danzig in August 1914, was seized and modified to carry seaplanes in December 1914 and January 1915. It operated in the Baltic until damaged by a mine on 4 June 1915. Repair efforts continued through April but proved unsatisfactory. In September 1916 *Glyndwr* was converted to a searchlight barrier vessel and mine depot ship. Surrendered to Britain in 1919, it was repaired and re-entered merchant service, sailing under British and Greek flags until scrapped in the mid-1950s.	

Oswald	
Displacement	7,640 tons
Dimensions	370ft x 50ft x 22ft
Machinery	one triple-expansion steam engine (one shaft), two boilers, 1,650shp
Fuel	Coal
Max Speed	10kts
Armament	two 8.8cm AA
Aircraft	four
Launched	November 1905
Completed	1906
Commissioned	July 1918
Interned at Danzig in August 1914, the British-flagged *Oswestry* was seized in the summer of 1917, renamed *Oswald*, and used as a minesweeper depot and transport. Converted to a seaplane carrier in 1918, it served in the Baltic from July to November 1918. Surrendered to Britain in 1919, it was sold to a Japanese shipping company, serving until sunk by American aircraft in July 1945.	



SMS *Stuttgart* was a gunnery training cruiser, and served in the scouting forces through 1917. The Jutland veteran was converted to a seaplane carrier to give the High Seas Fleet an aviation vessel capable of steaming with the fleet. (Bundesarchiv, Bild 134-B3827/o.Ang.)

F

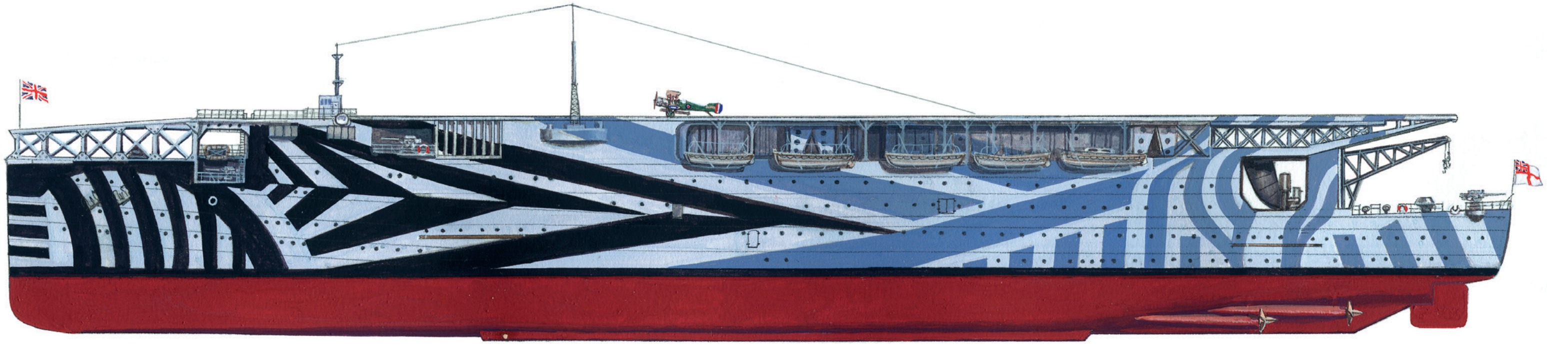
THE REST OF THE FLEET

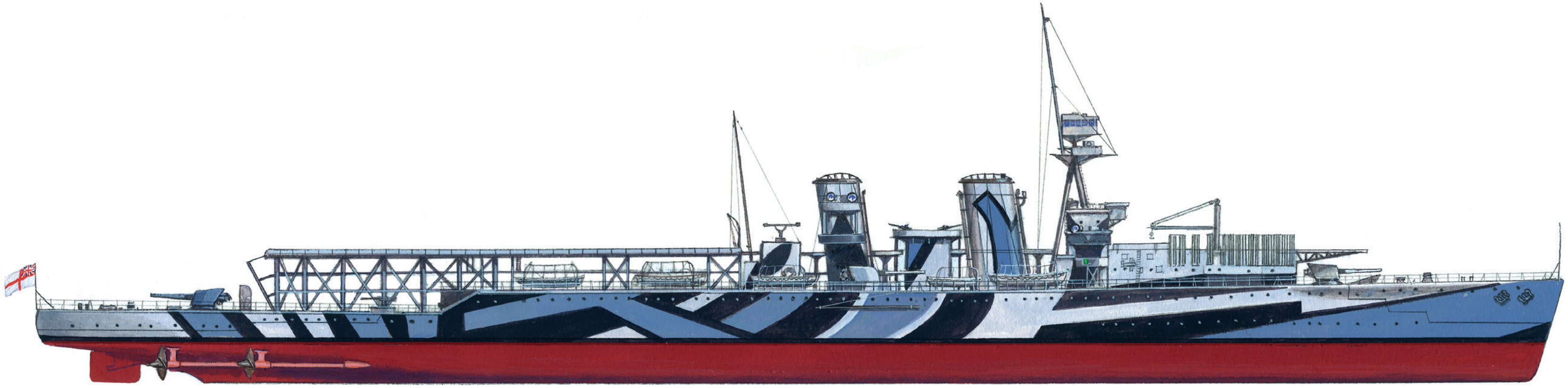
Only the Royal Navy had aircraft carriers during World War I – ships capable of operating aircraft with conventional landing gear. *Furious*, the first, was joined by two more by war's end. HMS *Argus*, joined the fleet on 14 September 1918. HMS *Vindictive* was commissioned on 9 October 1918. Very different ships, they were very different conceptions of aircraft carriers.

When the Royal Navy needed more aviation ships, the unfinished *Argus*, intended as a high-speed cargo liner, was a logical conversion candidate. By then the ability to launch and land aircraft on a ship's deck was desirable. Rather than build *Argus* as a mixed carrier, a more radical solution was proposed: put a flat, unobstructed landing deck running the length of the ship. *Argus* carried the unobstructed deck to the extreme of allowing only a small retractable charthouse above the flight deck, and angling smokestacks and antennae off to the side.

Vindictive was built with a flying-off deck forward, and a landing deck aft. As much a demonstration of a mixed-use warship as of an aircraft carrier, *Vindictive* began as a Hawkins-class cruiser. It had the speed and (as was believed) size requisite for an aircraft carrier. Unfortunately, retaining cruiser functions crippled its usefulness as an aircraft carrier. To allow the aft turret a free field of fire, the landing deck's potential length was shortened by one-third. Turbulence from the superstructure and smokestacks made landing dangerous.

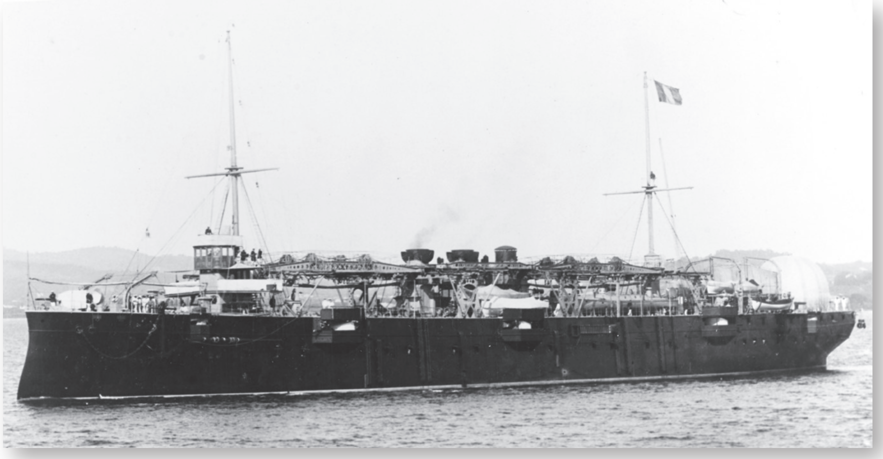
Both ships are shown in the dazzle pattern camouflage of 1918.





Stuttgart	
Displacement	3,413 tons
Dimensions	383ft x 43ft 6in x 17ft 6in
Machinery	two vertical triple expansion (two shafts), 11 boilers, 13,000shp
Fuel	Coal
Max Speed	24kts
Armament	(as seaplane carrier) four 10.5cm LA, two 8.8cm AA
Armour	deck – 80mm; conning tower – 100mm
Aircraft	three
Launched	9 September 1906
Completed	1 February 1908
Commissioned	(as seaplane carrier) 16 May 1918
A light cruiser, *Stuttgart* was converted to a seaplane carrier in January 1918 to give the navy an aviation vessel capable of steaming with the fleet. Canvas hangars were added aft, carrying three seaplanes. From May through to November 1918 *Stuttgart* served with the High Seas Fleet. It was surrendered to Britain in 1920, and scrapped.	

France



Foudre was built as a torpedo boat carrier, the product of France's *Jeune École*. *Foudre*'s first brush with aviation came in 1898, when it was used as a base ship for balloons. A balloon can be seen on its stern. (USNHHC)

Foudre	
Displacement	5,971 tons
Dimensions	389ft 6in x 66ft 2in x 23ft 6in
Machinery	two triple expansion (two shafts), 24 boilers, 11,800shp
Fuel	Coal
Max Speed	19kts
Armament	eight 100mm, four 65mm, four 47mm
Armour	deck – 4.2in; casemate – 2.1in; conning tower – 3.9in
Aircraft	eight
Launched	20 October 1895
Completed	1896
Commissioned	(as seaplane carrier) March 1912
Originally built as a torpedo boat carrier, *Foudre* was converted to a seaplane carrier in 1912 by the installation of an aircraft hangar aft of the third funnel. It was the first vessel permanently modified to carry aircraft. A take-off platform was added in May 1914, but replaced with a seaplane-handling platform. *Foudre* served in the Mediterranean throughout World War I, supporting operations off Montenegro, the Dardanelles, and Port Said. Placed in reserve in 1920, *Foudre* was stricken in 1921 and scrapped in 1922.	

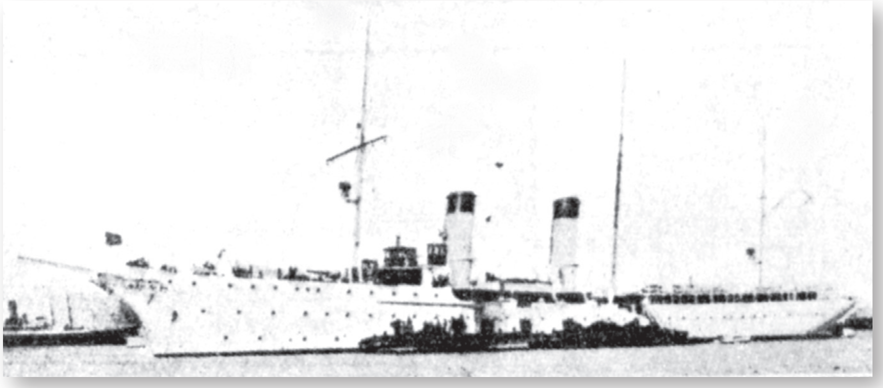
Campinas	
Displacement	3,319grt (probably 7,800 tons displacement)
Dimensions	357ft 6in x 42ft 7in x 25ft 2in
Machinery	one triple expansion (one shaft), two boilers, 1,130shp
Fuel	Coal
Max Speed	11.5kts
Armament	one 100mm, one 47mm
Aircraft	ten
Launched	1896
Completed	1897
Converted	late 1915
A mercantile cargo liner, *Campinas* was converted to a seaplane carrier to support operations off Port Said. *Campinas* supported naval operations off Port Said in 1916 to 1918, and also participated in the 1917 Athens intervention. Returned to her owners after the war, her subsequent history is unknown.	

Nord* and *Pas-de-Calais	
Displacement	1,541grt
Dimensions	338ft x 35ft x 11ft
Machinery	reciprocating engine (2 side paddlewheels), 5,500shp
Fuel	Coal
Max Speed	21kts
Armament	two 47mm
Aircraft	three
Launched	1898
Completed	1899
Commissioned	*Nord* – 26 June 1916; *Pas-de-Calais* – 1 July 1915
Nord and *Pas-de-Calais* were cross-channel paddlewheel packets. Both were requisitioned in 1914 as auxiliary cruisers. *Pas-de-Calais* was subsequently converted to a seaplane carrier with aircraft hangars aft in 1915, with *Nord* being converted in 1916. Both patrolled the English Channel, with *Nord* operating out of Dunkirk and *Pas-de-Calais* out of Cherbourg. Both were returned to civilian use in 1919, but their subsequent histories are unknown.	

Russia

As with Germany, except for one ship, *Almaz*, built as a warship, all Russian seaplane tenders were merchant conversions. Only those modified with permanent aviation facilities are included below.

Almaz	
Displacement	3,285 tons
Dimensions	363ft x 43ft 6in x 17ft 6in
Machinery	Triple expansion (two shafts),? boilers, 5,600shp
Fuel	Coal
Max Speed	19kts
Armament	seven 4.7in, four 3in AA
Armour	deck – 3in
Aircraft	Four
Launched	2 June 1903
Completed	February 1904
Commissioned	(as seaplane carrier) early 1915
A combination yacht-cruiser, *Almaz* fought at Tsushima and escaped. Subsequently assigned to the Black Sea Fleet, it was converted to a seaplane carrier in 1915. It led numerous aerial raids against Turkey and Bulgaria between 1915 and 1917. After the November Revolution, it became a Bolshevik headquarters ship, but was seized by French interventionists at Odessa. White Russian forces subsequently sailed it to Algiers in 1920. Seized by France in 1928, *Almaz* was scrapped in 1934.	



Almaz in 1919. Despite making only superficial changes to *Almaz* and the rest of the Russian Black Sea seaplane carrier force, Russia used naval aviation more effectively than any other nation except Britain. (AC)

Orlitza	
Displacement	3,800 tons
Dimensions	300ft x 40ft x 18ft
Machinery	one vertical triple expansion (one shaft),? boilers, 1,650shp
Fuel	Coal
Max Speed	12kts
Armament	eight 3in, two MG
Aircraft	Nine
Launched	?
Completed	1903
Converted	2 February 1915
A pre-war cargo-passenger liner, *Orlitza* was converted to a seaplane carrier in late 1914 to early 1915. It served in the Baltic, mainly in the Gulf of Riga between 1915 and 1917, taking an active role against the German Army and Navy. In April 1918, in Helsingfors, it steamed to Kronstadt, joining the Bolshevik forces. It re-entered merchant service in 1919 under the Soviet flag, and was reported to have been in use until 1939.	

G HANDLING AIRCRAFT

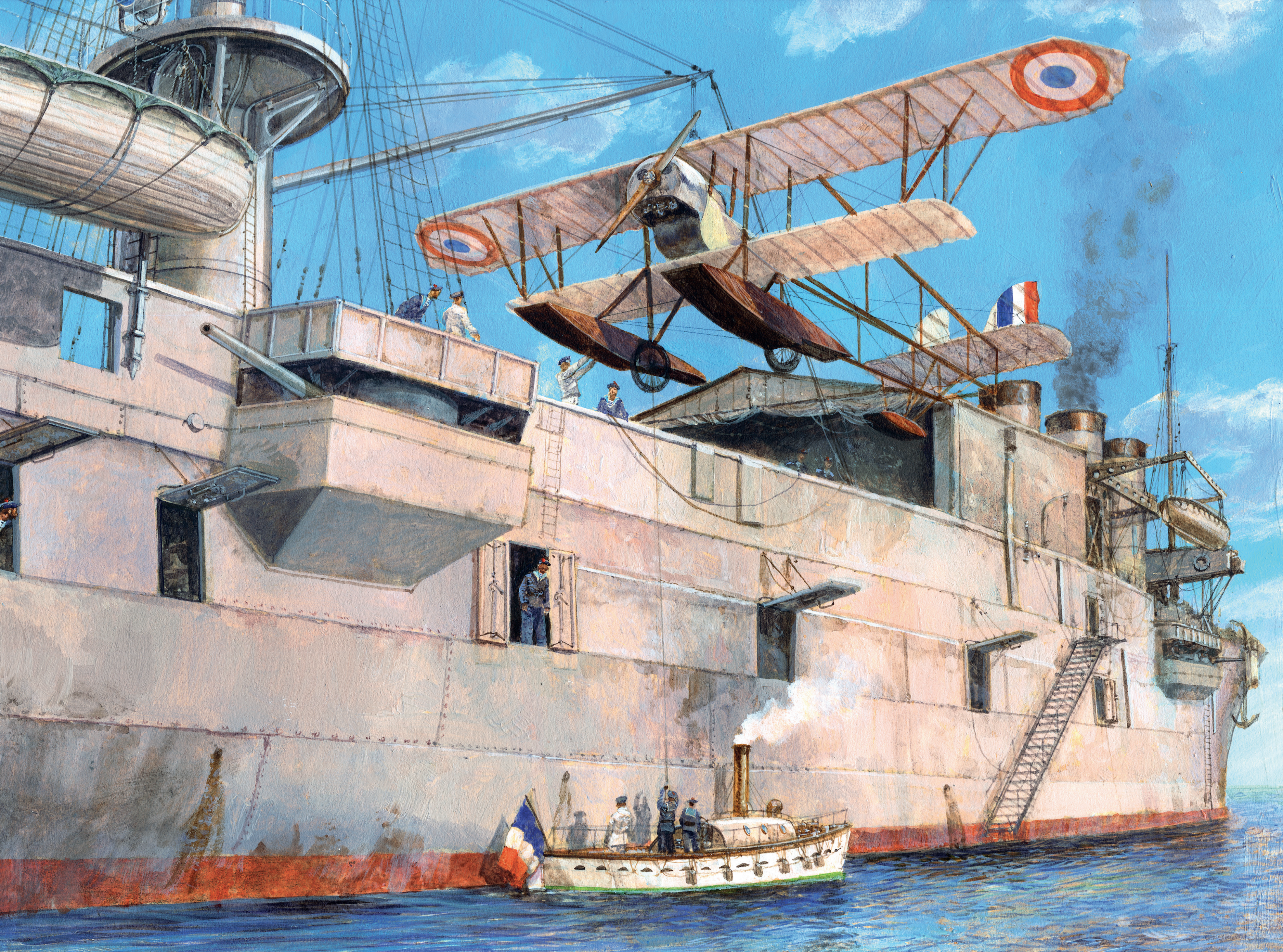
While launching off was relatively straightforward, landing on a ship was considerably trickier. So much so that no one regularly attempted it until 1917. Instead, aircraft either headed for land or put down on water when the mission was done. Then they taxied over to their mother ship, which used a boom to lift the seaplane out of the water, swing it inboard and place it on the deck.

Placement would be accomplished by a gang of sailors who carefully lowered the seaplane to the deck, ensuring it was not damaged. If a seaplane needed to be moved after being hauled aboard, it would be placed on a wheeled trolley, to simplify moving it.

The difficulties this presented are plain. To recover a seaplane, the carrier would have to stop, remaining motionless at least until the seaplane had been hooked onto the boom and lifted out of the water. Additionally, if the water was rough – and not necessarily very rough – the combination of a rolling and pitching ship and a rolling and pitching aircraft made it difficult to hook the aircraft onto the boom without damaging the aircraft.

As a result, the preferred location from which to launch or recover a seaplane was a sheltered harbour. There, submarines could be excluded and waves lower. Only Britain and Russia routinely launched aircraft on open waters.

This plate depicts a standard seaplane recovery operation. The *Foudre*, shown here, was France's first seaplane carrier, and arguably the first warship commissioned as a seaplane tender. It is shown here, somewhere in the Mediterranean Sea where it served throughout World War I, as it recovers a Caudron Type F floatplane. The Caudron was often configured as an amphibian, with the floats placed around the wheels to permit runway as well as water landings.

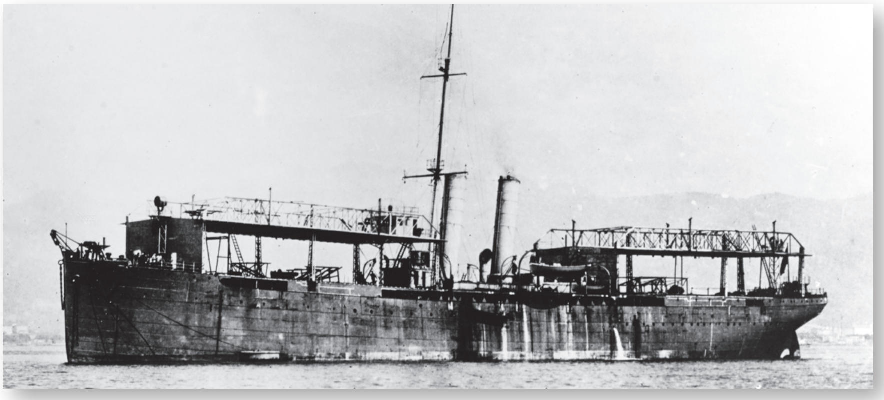


Imperator Nikolai I* and *Imperator Alexandr I	
Displacement	*Imperator Nikolai I* – 9,230 tons; *Imperator Alexandr I* – 9,240 tons
Dimensions	381ft x 52ft x 26ft
Machinery	Triple expansion (two shafts), four boilers, 3,900shp
Fuel	Coal
Max Speed	*Nikolai* – 13.5kts; *Alexandr* – 15kts
Armament	six 4.7in, four 3in
Aircraft	Eight
Launched	?
Completed	1913
Converted	Early 1915
Two cargo liners built for the Egypt–Black Sea trade, they were requisitioned in 1914, and subsequently converted to carry seaplanes in early 1915. Both ships were active in operations against the Turks between 1915 and 1917. Their aircraft sank the largest vessel sunk by aircraft during the war, a collier of 4,200 gross register tons. After the 1917 revolution, they were renamed *Respublikanetz* and *Aviator*, respectively, by the revolutionaries, but were seized by France during the 1919 intervention. Both entered the French merchant fleet, as *Pierre Loti* and *Lamartine*, and were sunk during World War II.	

Ruminia	
Displacement	4,500 tons
Dimensions	355ft 3in x 42ft x 15ft
Machinery	Vertical triple expansion (two shafts), five boilers, 5,400shp
Fuel	Coal
Max Speed	18.5kts
Armament	four 6in, four 3in AA
Aircraft	seven
Launched	1904
Completed	?
Commissioned	1916
Built in France for Romania, *Ruminia* entered Russian service as a seaplane carrier after Romania entered the war as a co-belligerent in August 1916. Operating briefly in the Black Sea before the 1917 revolution, it was seized by revolutionaries and renamed *Rouminskaya Republika*. It was returned to Romania, probably in 1919. Its subsequent fate is unknown.	

Italy

Europa	
Displacement	8,800 tons
Dimensions	405ft 2in x 46ft 3in x 19ft 2in
Machinery	one vertical triple expansion (one shaft), two boilers, 2,300shp
Fuel	Coal
Max Speed	12.2kts
Armament	two 3in AA
Aircraft	eight
Launched	4 August 1895
Completed	1896
Converted	6 October 1915
Europa was in merchant service for an Italian shipping company when purchased by the Italian Navy in February 1916. It was converted to a seaplane and submarine depot ship, with hangars added the length of the ship. It operated at Brindisi from October 1915 to January 1916, and thereafter at Valona, in Albania through November 1918. It was harbour based. *Europa* was stricken for scrapping in 1920, and subsequently broken up.	



Italy's *Europa* was one of the largest seaplane carriers of World War I. It could house eight aircraft in its hangars, but operated only as a seaplane depot ship from harbour. (USNHHC)

Japan

Wakamiya	
Displacement	7,720 tons
Dimensions	365ft x 48ft 2in x 19ft
Machinery	one vertical triple expansion (one shaft), three boilers, 1,600shp
Fuel	Coal
Max Speed	9.5kts
Armament	two 3in LA, two 47mm LA
Aircraft	four
Launched	21 September 1901
Completed	1902
Converted	September 1913
Originally the British-flagged *Lethington*, the ship was captured by the Japanese in 1905 carrying cargo for a Russian port, and seized as a legal prize. It entered Japanese service as a transport in 1905 as *Wakamiya Maru*. In 1913, it was converted to fleet auxiliary as a seaplane carrier to test naval use of aviation. In September 1915 it began operations against the German-held port of Tsingtao, launching the world's first airstrike on 5 September. It was re-rated as an aircraft depot ship in 1915, and reclassified as an aircraft carrier in 1920, after a take-off deck was added. *Wakamiya* was placed in reserve on 1 December 1925, and stricken from the naval list in 1931 and scrapped.	

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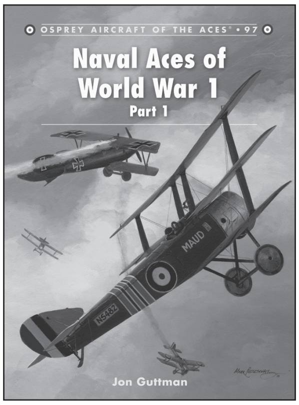
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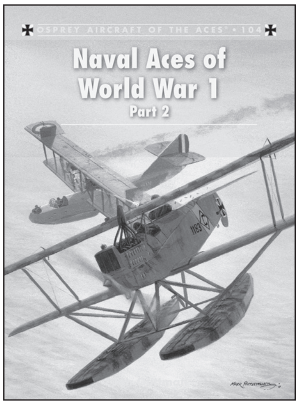
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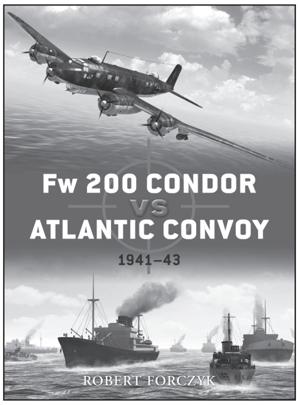
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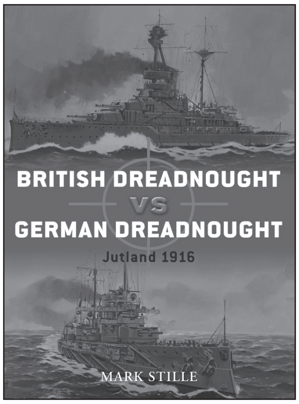
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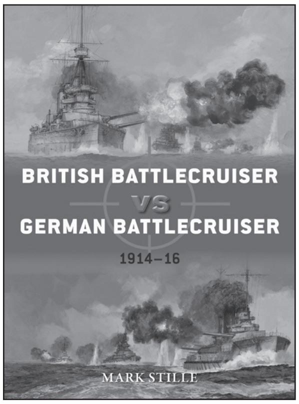
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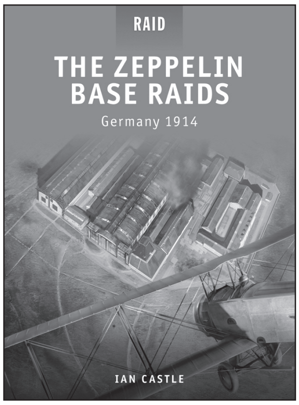
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